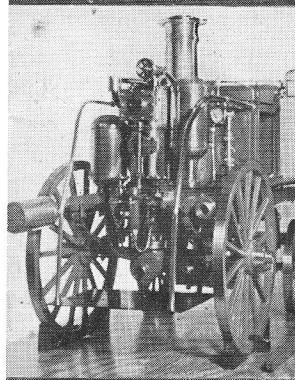
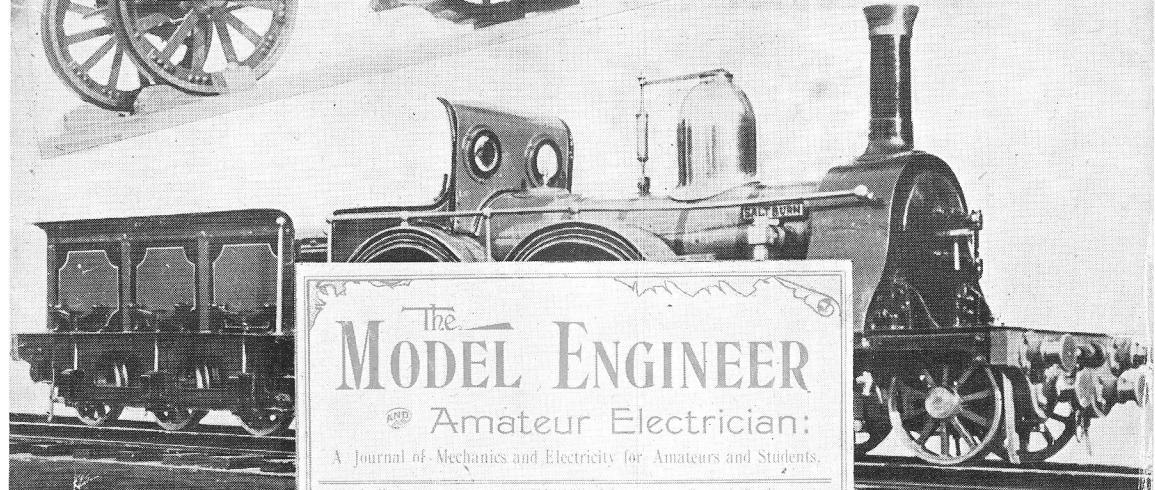


THE MODEL ENGINEER



The MODEL ENGINEER

AND

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A Journal of Mechanics and Electricity for Amateurs and Students,

VOL. 98

No. 2432

JANUARY 1948

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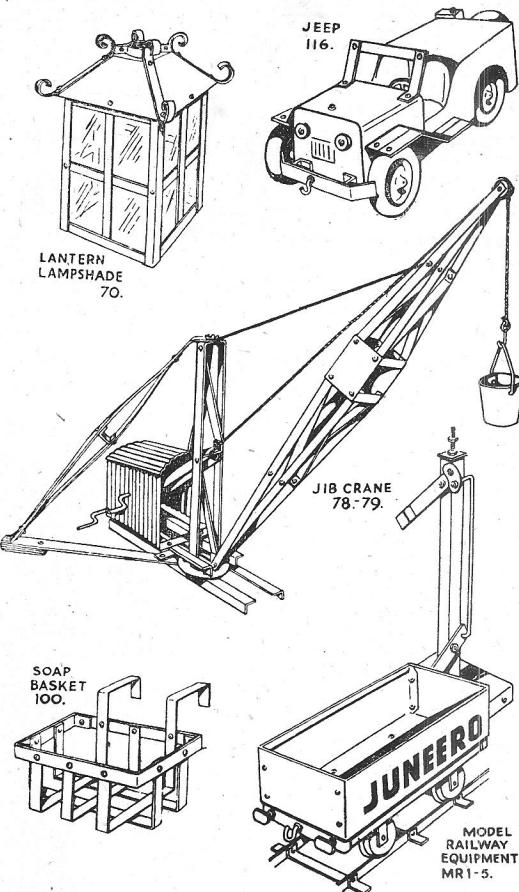
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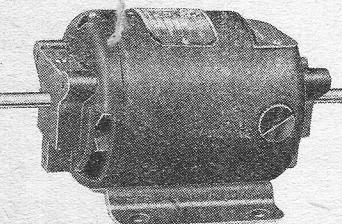
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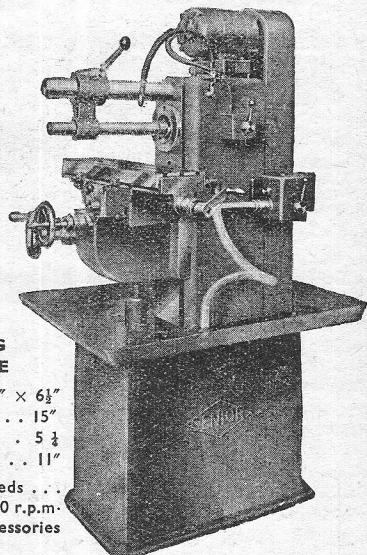
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SMOKE RINGS

A New Year Wish

● MAY I extend my warmest good wishes to all my readers for the New Year. May it bring them much happiness, good health, good friends, and good fortune. A comprehensive wish that, but a very sincere one which I hope will mature as the weeks go by. Whatever the restrictions or difficulties this troubled world may impose upon us, there is always our workshop to which we may retire in peaceful contemplation and occupation. There is always the club meeting where we may foregather with our friends and talk about many pleasant things. There is always the "M.E." which brings you cheerful contact with your fellow enthusiasts the world over. So with these bright thoughts in mind I can safely feel that my good wishes to you all will fall on fruitful ground.

Our Fiftieth Anniversary Number

● I FEEL I owe an apology to my readers for occupying so much space in this issue with our own affairs. But a fiftieth-year does not come very often in the history of any journal and I feel a modest degree of pride in the survival of THE MODEL ENGINEER. I say "survival" for we have passed successfully through two long periods of war years, in the second of which we suffered severely from enemy action. There is, however, an indomitable spirit behind THE MODEL ENGINEER and its most loyal staff, which does not

admit defeat, and so, in spite of drastic paper restrictions, our fiftieth anniversary issue emerges to mark a notable milestone in our career. I am very grateful for the kindly letters of appreciation which have reached me during the past few weeks, and hope that in the years to come we may continue to deserve similar good opinions. No one can foreshadow the changes which will come over model engineering during the next half-century. Science marches ahead, the world awaits the useful application of atomic energy, television is already with us, and the wireless radiation of heat, light, and power is a distinctly possible future development. New tools and machines, new materials, and new methods will all influence the activities of the home workshop and provide new interests for the model engineer. The achievements of the future however astonishing they may be will not entirely efface the records of the past, and there will always be a wealth of prototype material for the enthusiastic model maker who likes to revive in miniature form some of the engineering and ship-building glories of the eighteenth and nineteenth centuries. The model engineer of the future will never be at a loss for something to make, something to experiment with, something to give him happy and worth-while occupation. In whatever direction his interest may turn it will be the constant purpose of THE MODEL ENGINEER to serve him as guide, philosopher, and friend.

mation about model-making. I found very little, though it is true that here and there an article on model-making or amateur mechanical work occasionally appeared, mixed with other information of an unrelated scientific character. I have a grateful recollection of my personal interest in the columns of *English Mechanics* of those days, particularly for its articles on ornamental turning and other forms of workshop interest. But nowhere could I find a journal which specifically catered for the interests of model makers or for the amateur engineering enthusiast. There must, I thought, be many lone hands without a regular meeting place in print, and without a platform on which they could exhibit their productions, exchange their experiences, and discuss their workshop methods. So, I thought, why not launch a paper to bring them all together in a friendly family spirit? That is how THE MODEL ENGINEER was born. In spite of Mr. R. A. Lee telling me that I should be lucky to sell 500 copies as model engineering was dying out, the first two monthly issues were sold completely, and had to be reprinted to satisfy the demand. It is now known all over the world, and its present sales of many thousands a week are restricted only by the prevailing rationing of paper.

The Famous "Como"

While preparing No. 1 for the printer I had a remarkable piece of good fortune. I saw in *The Engineer* a photograph and description of a beautiful model of the L.B.S.C. Rly.'s locomotive "Como," which had just been made by Dr. J. Bradbury Winter of Brighton. I wrote to Dr. Winter asking if I might come and see his model. A cordial invitation resulted not only in my delighted inspection of what I have always regarded as the most perfect example of true scale locomotive modelling in existence, but it marked the beginning of a much treasured friendship with a charming and outstanding mechanical genius in the person of Dr. Winter himself, a friendship which has given me the greatest pleasure and brought me much kindly co-operation for half-a-century. The article on the "Como" at that early stage in the history of THE MODEL ENGINEER set a standard of perfection in model-making the influence of which, has, I am sure, been felt by readers through all those many subsequent years. The lovely "Silver Rocket" locomotive later set the seal on Dr. Winter's reputation.

Castings and Supplies

In those early days the castings available for model engine building were mostly of a very primitive character. Somewhat spidery and old-fashioned in design, and decidedly lacking in a sufficiency of material for turning and fitting they set the enthusiast a real problem to preserve the exactitude of dimensions necessary to make a working fit of the various parts. Notable exceptions were the locomotive castings marketed by Mr. Waller Martin of West Ham, which were excellent both in design and quality, his Tilbury tank engine being a particularly good production. The Ardwick Engineering Co. of Manchester also achieved credit for their castings

for small launch engines. The passing of both these concerns caused a gap in model supplies until Mr. Stuart Turner of Henley-on-Thames brought his long experience as a marine engineer to bear on the design and production of a small vertical steam engine characterised by robust and technically good design, and by the high quality of the pattern-making and castings. This was an immediate success and led to the inauguration of the business of Stuart Turner Ltd. now so well-known for its attractive range of small steam and petrol engines and for the excellent quality of its castings produced in its own well-equipped foundry. In the model railway field Mr. W. J. Bassett-Lowke and his partner Mr. Franklin were setting a new standard in up-to-date scale modelling of locomotives, rolling stock, and all the accessories of a realistic model railway, and in steam fittings for all types of model engines. In ship modelling also they broke new ground with excellent models of famous warships and liners, and with a very complete range of deck fittings for ships of all types. Mr. Alfred H. Avery pleased amateur electricians with an excellent series of castings for building small dynamos and motors of good technical design and started many young engineers on the road to success in the electrical profession. Modern minds were in fact applying themselves to the needs of model engineers, and their influence was felt in the big change which then came over the supply business and the interesting trade catalogues from which the amateur craftsman selected his materials. Since those days many new firms have come into being, far too numerous for me to mention by name, but all catering for the model engineer in helpful fashion enabling him to keep pace with the triumphs of the modern engineering world in the miniature productions of his own workshop.

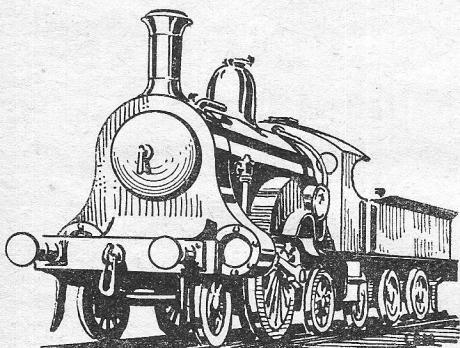
A Notable Character

In those days model engineers were often in need of "bits and pieces" and oddments for carrying out experimental work, and I call to mind a treasure house of such material which existed in Chenies Street, Tottenham Court Road, under the proprietorship of a Mr. Caplazzi. He was a remarkable man, of the Jewish persuasion, with a long beard and a fluency in all European languages, including broken English. He had a profound knowledge of optics, electricity, and mechanics, and in spite of his somewhat neglected and unprepossessing personal appearance, he was a most interesting man to meet. More extraordinary still was his warehouse, stocked to the roof with bits and pieces of scientific apparatus and models, machines, and tools of all kinds, most of it being more kindly described as "junk," but here and there something of real value to the scientist or experimenter. If you went to him in search of a fly-wheel, or a cylinder, or an induction coil, or a lens for a camera or a microscope, he would smile and say "Yes, I find you something," and from among the various dusty shelves or boxes he would produce the very thing you wanted. To his credit, I would add that his charges were of the most modest kind. I do not know what became of his remarkable assortment

of materials when he passed away, but his death was certainly a loss to the model engineering world of those days.

Waves of Model Engineering Interest

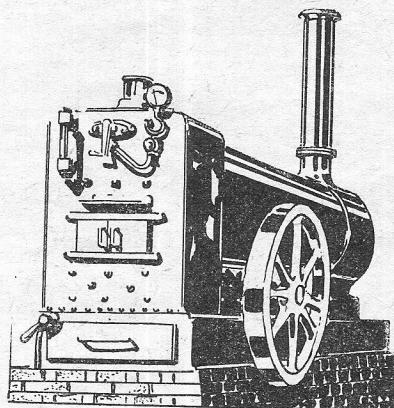
Those of my older readers who have followed the development of model engineering will have noticed that it has been influenced by waves of interest and activity, in keeping with the changes which have been apparent in the world of real engineering and applied science. In the very early years electricity was an outstanding attraction offering as it did the choice of fascinating experiments with wireless telegraphy, X-rays, induction coils and Wimshurst machines, small dynamos and motors, and the installation of home electric lighting plants. The arrival of the internal combustion engine brought interest in motor-cycles and light motor cars, and in gas engines for workshop driving and other small power purposes. The gas engine has rather faded from the picture due to the development of the petrol motor, particularly in the smaller sizes required for speedboats, model aircraft, and even locomotives and traction engines. The introduction of broadcasting set many model engineers to work constructing home receiving sets, a task they achieved with much success. But while these diversions were taking place there were two other attractions which have never lost their hold on the enthusiasm of model engineers. These were the application of steam to motive power in the form of small scale locomotives and traction engines, and the pursuit of records by model speedboats in which both steam and petrol have fought a most spectacular battle still marked by unending and effective rivalry. The steam locomotive, starting in our pages through the pioneer achievements of Mr. E. L. Pearce, and in later years so admirably fostered by "L.B.S.C." has become a permanent interest to thousands



Our first "live steam" locomotive. Built by E. L. Pearce. 1900

of model engineers, particularly when such engines are capable of doing actual passenger hauling on the track. A race of "live steamers" has grown up in all parts of the world, distinguished as much by their practical knowledge of locomotive anatomy, as by their constructive ability and their enthusiasm for the running of their engines. Long may they flourish! Steam

engines in their many forms including the impressive beam engines and mill engines of the past, the traction engine now alas! giving place to the motor tractor, and the magnificent steam engines of the mercantile marine, are all constant sources of interest to the model engineer and provide him with an inexhaustible array of attractive prototypes for his skill. In recent years the petrol motor has captured public imagination through the motor-car, the aeroplane, and the



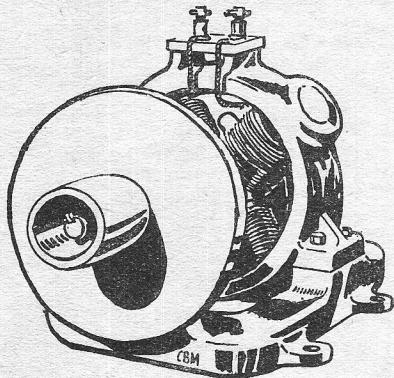
The "M.E." undertype engine. Designed by Henry Greenly. 1903

motor ship. The model engineer has not been slow to explore this field of constructive endeavour, and, as applied to speedboats and the powering of model aircraft, some very remarkable miniature motors have been designed and built. Mr. Edgar T. Westbury's many valuable contributions to knowledge in this field are well-known to all "M.E." readers. That model speedboats have raised their records from a very modest five miles an hour to the truly astonishing figure of close on fifty miles an hour is an apt commentary on the skill and ingenuity which has been applied to this truly experimental branch of the hobby. The latest enthusiasm for model racing motor-cars affords yet another field for petrol motor progress and constructive ability.

Behind these specialised features of the development of model engineering, there has been a remarkable background of patient and pleasurable endeavour in the modelling of historical prototypes of every kind, of ship and boat modelling, and of the construction and appreciation of tools and workshop equipment. Underlying all this activity is the inherent mechanical genius of the British race, which is forced in some way to find an outlet for its urge to fashion metals and materials into pleasing and perhaps utilitarian form. The hobby of model engineering has provided that outlet in a most rewarding and agreeable fashion as nowadays may be seen in exhibitions, club meetings, and in the pages of our journal. On the utilitarian side, mention must be made of the splendid technical and workshop services rendered to the country by model engineers throughout both the great world wars.

The Club Movement

No survey of the progress of model engineering would be complete without a reference to the club movement, a movement which starting when I founded the Society of Model and Experimental Engineers in 1898 has resulted in the formation of well over a hundred local clubs and societies, both in this country and in many parts of the Dominions and in the United States of America. These clubs provide meeting places where enthusiasts can gather together



The "M.E." 500-watt dynamo. Designed by Alfred W. Marshall, 1910

under enjoyable social conditions to display their work and exchange knowledge and experience to their mutual advantage. A glance through the club reports in our columns will reveal how successful and interesting are these meetings, and how much they contribute to the good-fellowship and mutual assistance for which model engineers are everywhere noted. Since in this issue we are celebrating our own fiftieth anniversary I would take this opportunity of congratulating the Society of Model and Experimental Engineers, the parent model society of the world, on its own similar celebration to take place later this year, an occasion which will be marked by a special exhibition of the work of its own members and those of its numerous affiliated societies. I give my cordial good wishes for the success of this notable display.

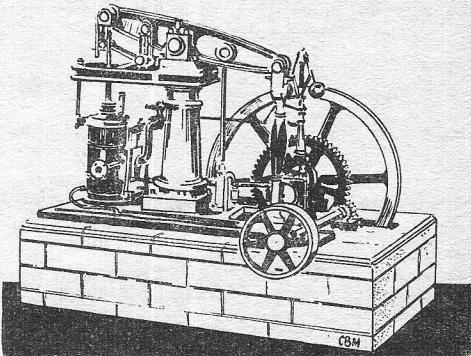
The "M.E." Exhibition

For many years past the annual MODEL ENGINEER Exhibition has been the rallying point for model-makers from all parts of the country and abroad, and for the display of the finest model-making efforts of the year. Apart from wartime interruptions it has been the high-spot of the year for model engineers and no effort will be spared by its organisers to maintain its attractiveness and popularity. It has set a championship standard in the art of model making and has undoubtedly exercised a profound influence on the advancement of good craftsmanship among the followers of the hobby. One notable feature of the exhibition has always been the display of productions and equipment by the trade firms associated with model engineering. This constitutes a veritable model market where the latest and the best in supplies are at the dis-

posal of the large public the exhibition always attracts.

Model Engineering Equipment

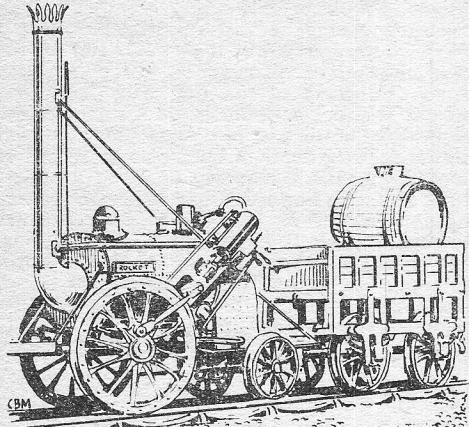
To tell the story of the growth of the trade in model engineering equipment and supplies would require an issue of the "M.E." to itself. I can only mention a few landmarks which persist in my memory. For example, the Britannia lathe, for a long time the stand-by of the amateur mechanic needing a practical tool at a popular price. But contemporary with this cheaper lathe, were the accurate and splendidly made tools, though naturally more expensive, built by Henry Milnes, father and son, at Bradford. A Milnes lathe gave first-class service for a lifetime. Then came the era of the "Drummond" lathe, particularly of the £5 round-bed lathe, which sold by the thousand. Arthur Drummond, a genius in machine tool design, realised the need of the home workshop, and produced not only this remarkable tool, but a whole range of lathes and light machine tools which made the name of Drummond famous throughout the model engineering world. This beginning eventually led to the establishment of one of the leading concerns in the British machine tool industry, noted everywhere for the ingenuity and economical performance of its products. The mantle of Drummond for model engineering tools has now descended on the Myford Engineering Co. whose reputation is growing apace. The remarkable £5. lathe made by Holmes of Bradford, and the "Wade" round-bed lathe, were other bygone milestones in the catering for model engineers with a limited pocket. For the supply of general workshop equipment the name of George Adams will long be remembered in high regard by our older readers. At one time agent for the famous "Pittler" lathe he was one of the earliest advertisers in THE MODEL ENGI-



The "M.E." beam engine. 1914

NEER, and for many years gave outstanding service and advice to our readers in all matters relating to the workshop. More familiar names to present readers are Buck and Ryan Ltd., a firm of generations of knowledge in the tool trade and one of the earliest exhibitors at an "M.E." Exhibition. Tyzack's who added the tradition of George Adams to their old-established business, and Garner's of Barnsley whose "Tool News" is as full of good things as their own well-stocked

warehouse. Moore & Wright (Sheffield) Ltd. have earned the gratitude of model engineers for enabling them to produce precision work with British-made measuring tools. On the models and materials side I have already mentioned Bassett-Lowke Ltd., and Stuart Turner Ltd. Bond's o' Euston Road is, of course, a Mecca for every model-maker in search of supplies. Only space prevents me from paying tribute



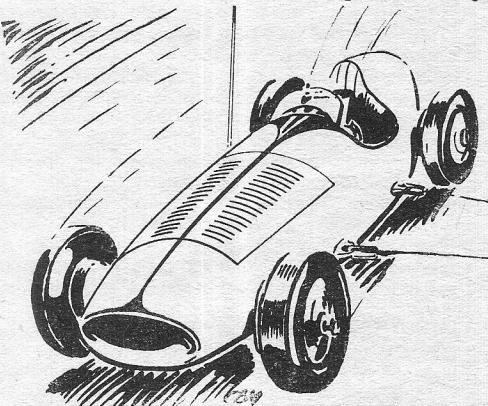
The famous "Silver Rocket." Built by Dr. J. Bradbury Winter. 1929-1932

to the many other firms who have made the path of model engineers an easy and pleasant passage. There is a certain amount of nonsense being talked in some quarters just now about the "commercialisation" of model engineering. Those who criticise should remember the debt they owe to the many business firms whose service and enterprise make their hobby both possible and practical. Whether it is in the supply of tools and models or materials, or in the publishing of journals and books, or in the promotion of exhibitions, all these concerns are enabling the hobby to develop on well-considered and helpful lines and provide a necessary service and stimulus to the well-being of model engineers wherever they may be. One might just as reasonably criticise the "commercialisation" of photography, or gardening, or any other hobby which has attracted an industrial surrounding to provide it with the material and equipment it requires.

The "M.E." Team

My story which, I am afraid, only just touches the surface of our wonderful hobby, would not be representative in its scope, if I did not express a few words of sincere gratitude to the many friends who have helped me to build up our journal to its present unique position. THE MODEL ENGINEER, except in its first year, has never been a one-man journal. It is true that in 1898 I worked alone. I was my own editor, draughtsman, typist, advertisement manager, and accountant. Each issue was largely a one-man job, but friends soon gathered round and the now famous MODEL ENGINEER team of expert writers and contributors began to function.

There was, for instance, my own life-long friend W. J. Tennant who out of his profound engineering knowledge wrote learnedly on locomotives and the slide-valve. Frank E. Powell joined me as sub-editor in 1899 and among other things designed an admirable working model steam hammer, and numerous small dynamos and motors. He is now a highly-regarded consulting engineer in New Zealand. Other stalwarts in those early days were Alfred J. Budd, Walter C. Runciman, Alfred H. Avery, Chas. S. Lake, W. Delves Broughton, Herbert Teague, and H. Muncaster. A veteran but still youthful member of my present staff is William H. Evans who for over forty years has been of unfailing service in providing our liaison with the printers and engravers and in the supervision of contributions, proofs, and "make-up." I am more than pleased to make this acknowledgment of his loyal devotion to myself and to THE MODEL ENGINEER through all these years. When the late Henry Greenly joined our staff a new impetus was given to the model locomotive and railway side of the hobby. A remarkably rapid draughtsman, a burning enthusiast for everything relating to steam, and with a quicksilver mind for solving engineering problems, he imparted his enthusiasm to thousands of our readers. Through his many designs and articles in our pages, and his excellent books on model engineering, his mark on the hobby will not readily be forgotten. George Gentry I think I might describe as the "main-spring" of many of our articles on horology, and I extend my compliments to him on the meticulous accuracy and detail of his notable articles on the "M.E." beam engine, and the



The model engineer's latest delight. A model petrol racing car. 1948

"Midge" locomotive, and many workshop subjects. I naturally have an affectionate remembrance of my late brother, Alfred W. Marshall whose encyclopaedic knowledge of all engineering and electrical matters was for so long at the service of our readers. In particular his contributions under the signatures of "Inchometer" and "Phantom Pen" gave inspiration to many novices in the art of model-making. Mr. J. N. Maskelyne needs no eulogies from me. He has been a tower of strength on our editorial side

for many years past, and his love of locomotives is only equalled by his regard for all his model engineering friends. Our present production editor, P. Denman, is worthily maintaining the "M.E." tradition of good presentation of the "words and music." Outstanding in our list of distinguished contributors is, of course, that genius of the small power locomotive "L.B.S.C." A master of his subject and most instructive and entertaining with his pen he has guided thousands of model engineers safely and successfully through the intricate paths of locomotive construction, and made them his admiring and appreciative "mates." There is a long list of contributors and correspondents to whom I owe my warmest thanks for their continued participation in our crusade for good model-making. To mention only such names as "Uncle Jim" Crebbin, Ernest W. Fraser, "Bill" Hart, Hambleton and Ian Bradley, is sufficient to indicate the strength of the team battling for our side.

The Future of Model Engineering

I have no hesitation in saying that the future

of model engineering is fully assured. There will always be natural craftsmen who love doing good work for its own sake, there will always be enthusiasts who love to explore and revive in miniature form the engineering triumphs of the past, there will always be experimentalists who will delight in investigating the realms of scientific discovery and in their own workshops contributing to its progress. All these good folk THE MODEL ENGINEER will continue to serve with unabated energy, it will always offer them a platform for a record of their work, and for the dissemination of that mutual goodwill which is the hall-mark of the true model engineer. In this article I have attempted a survey of the happenings of the past fifty years. May the next half-century be marked by a parallel record of progress, and if I may say so in all modesty, by a corresponding rendering of faithful service to all who may be included in our constantly expanding circle of happy and friendly readers. May I still be able to play my small part in this agreeable occupation which has brought me so much friendship and kindly response through the greater part of my life.

Etching on Metal

THE usual way to mark tools is to coat the tool in question with a thin film of wax and then after scratching the desired marking through the wax to etch the surface of the metal with acid. This process is very satisfactory when done properly, but in the hands of an amateur difficulties sometimes arise. The chief source of trouble is the wax film which may not cut at all well under the scriber and very often shows a tendency to flake off. Another trouble is that if the wax film is thin it is difficult to see what has been written and yet on the other hand if the wax is thick it is difficult to persuade the acid to fill the deep groove and attack the metal. All these difficulties can be overcome easily by using artists' etching ground and applying it in a manner similar to that used by the artist.

The ground generally consists of a hard, dark-brown, wax-like substance. It can, or at least could be, bought at an artists' supply shop for about 1s. per ball—and a ball will last a long time. For those amateurs who prefer to make their own ground the following is a well-known formula which was found to give good results :—

White wax, 2 parts.

Gum mastic, 1 part.

Asphaltum, 1 part.

Melt the wax first and dissolve the mastic in it, then add the asphaltum. When all is completely melted stir well and then pour the whole into a bowl of cold water. Immediately recover the plastic mass from the water and while it is still soft knead it into balls about the size of a walnut. During the melting of the ingredients care should be taken not to let them catch fire, as all are highly inflammable. If white wax is not available use ordinary yellow beeswax.

To apply the ground, first prepare a dabber. This consists of a piece of silk or fine cotton cloth wrapped around a tuft of cotton wool

to form a soft smooth pad. The metal to be etched should now be heated until rather too hot for the hand to bear and the ground rubbed on. Do not put too much ground on but see that the whole surface of the metal is covered. Now while the metal is still hot and the ground molten, dab all over the surface with the dabber previously prepared. This will remove much of the ground and what is left will be spread over the metal surface very evenly. Don't worry if at this stage the metal appears to have very little in the way of a covering of the ground. This is just what is wanted ; every mark on the metal should be visible through the ground.

When the metal is cool the coated surface should be smoked by holding it over a smoky flame. A wax taper will do for small jobs but a paraffin or benzene flame is better. During the smoking the ground should melt and absorb the soot. This will give a hard smooth black surface with an eggshell finish on which the writing or design to be engraved will show up very clearly. All that remains now is to scratch the design on the prepared surface and then to etch it by covering over the design with acid. There are various etching solutions but for most amateur work dilute nitric acid is satisfactory. This acid will attack most metals. It will also attack fingers and clothes, so it should be treated with great care. Use the acid as supplied by the chemist diluted with an equal quantity of water and etch for between ten and twenty minutes. It is as well to prepare a scrap piece of metal with ground and to etch this at the same time. Part of the ground from the scrap metal can be scraped away from time to time and the progress of the etching observed. When etched deep enough the work should be well washed in water and then the ground removed with a solvent such as benzene.—VULCAN.

IN THE WORKSHOP

Introduction

by "Duplex"

EVERY YEAR since its inception, a profitable and prolonged visit has been paid to the Model Engineer Exhibition, and, whilst the craftsmanship and technical knowledge of the more expert have always been admired, it has been evident that there is a large body of less experienced, but none the less keen, visitors who, judged by comments overheard and questions asked of the stand attendants, are in need of help and guidance in the more elementary aspects of mechanical work and workshop routine. A visit to last year's Exhibition did nothing to dispel this view, and, if anything, the number of recruits appears to be increasing. Furthermore, the position of newcomers becomes increasingly difficult as prices rise and the supply of workshop equipment remains so restricted and so long delayed. The solution of these difficulties must, for the time at least, depend largely on making an ever increasing use of our present tools and developing their possibilities to the full; in addition, the importance of devising and making new tools and appliances to further the scope of

our hobby and our work should be fully realised. It is with this in mind, that an attempt is being made in a small way to help others to share the benefits derived from our own mechanical work over a period of many years.

Let it be said that it is intended, as far as possible, to write of work done in our own workshops and of tools and appliances either made at home, or of which there is first-hand experience.

With regard to engines of all kinds, whether they be models or prototypes, our main concern is with the practical machining processes involved, rather than with theoretical questions of design.

For the sake of variety, it is, perhaps, as well that these articles will, of necessity, deal with workshop matters in no particular order and in accordance with no set plan, for our work will in part doubtless be to deal with difficulties and requests brought to our notice by correspondents, and, when these topics are of general interest to readers, they will be discussed in these pages.

1—KNURLING

THIS is a process by which a pattern is formed on the surface of the work, usually to give a finger-hold, as in the case of instrument terminals and finger-operated nuts and screws. If the work is poorly carried out, not only will the finger grip be impaired but the appearance of the finished part will suffer; in fact, the appearance of the knurling on hand tools and machine parts will give some indication of their quality, for, where rigid factory inspection is in force, poor work in this and other respects will be rejected.

The pattern knurled is usually either of the straight line form, shown in Fig. 1A, or of the diamond pattern illustrated in Fig. 1B. Moreover, knurls are made in various pitches, so that a pattern of a size suitable to give an adequate finger hold and a good appearance to the work can be selected.

The knurling operation is carried out by pressing the hardened steel knurls against the work while it is revolving in the lathe, and, although the pattern is impressed or rolled on to the work, there is at the same time a definite cutting action when properly formed knurls are used, as is shown by the fine metal chips produced.

To form straight serrations on the work, a holder with a single wheel, as shown in Fig. 2, will suffice, but for diamond knurling two wheels of opposite "hand" are used to give the necessary crossing cuts.

When one or more wheels are used in this manner to operate on steel, the considerable thrust that has to be exerted is transmitted to the lathe mandrel and its bearings, and, in the case of a lightly constructed headstock, this may prove highly detrimental; moreover, slender work, even when supported by the tailstock centre, may be distorted and thus render the operation impracticable.

To overcome these difficulties, special holders of the types shown in Figs. 3, 4 and 5 may be used, whereby the pressure applied to the knurls grips the work at diametrically opposite points and so relieves both the work and the lathe bearings of radial load.

It will be clear that the ordinary form of travelling steady cannot in this instance be used to support the work, as it would tend to obliterate the pattern formed by the opposed knurling wheel, but, where two opposed wheels are employed, each acts as a steady to the other.

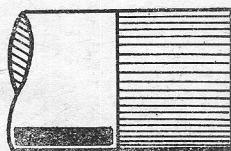


Fig. 1A

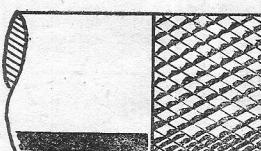
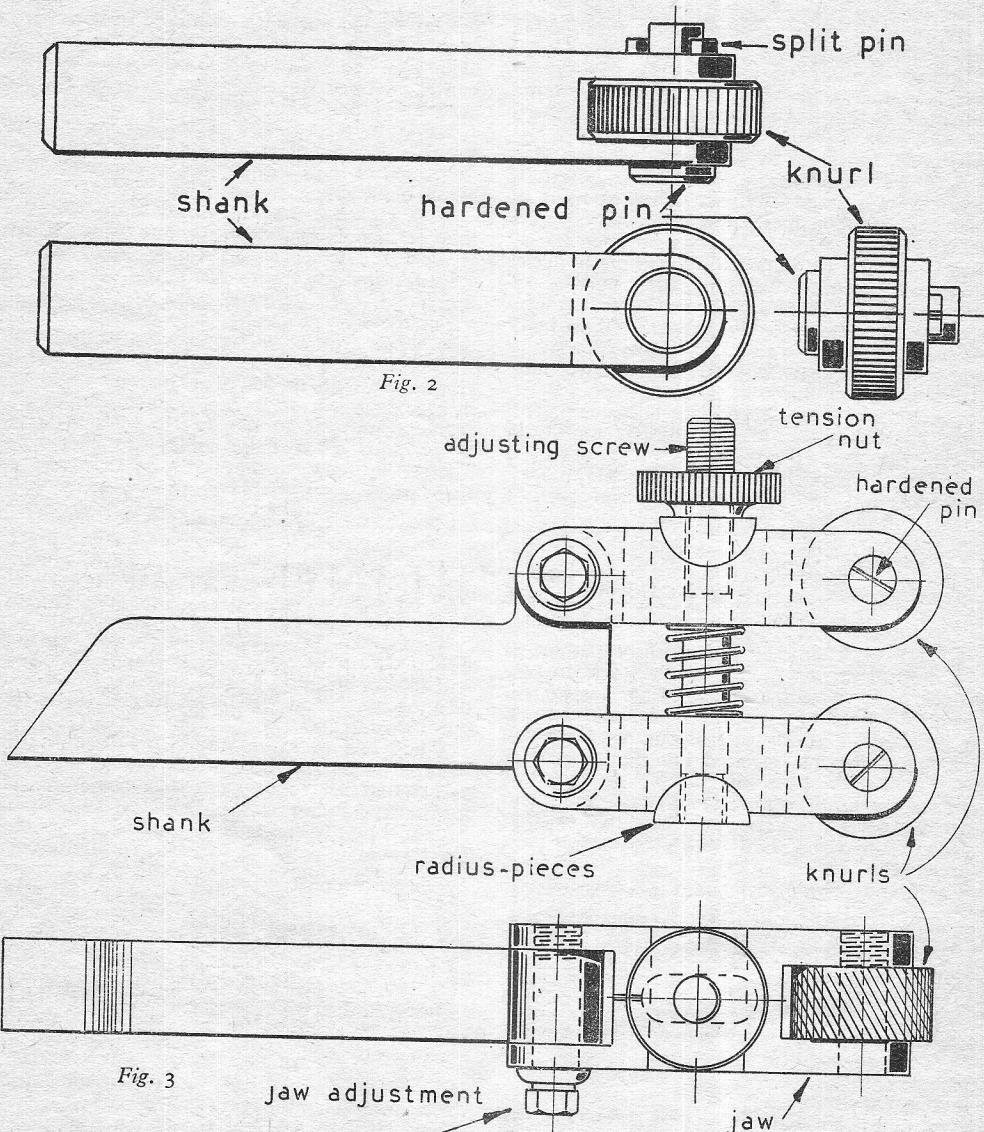


Fig. 1B

The knurling tool holder shown in Figs. 3 and 4, which is a modified form of a design published in THE MODEL ENGINEER some years ago, can be readily made in the small workshop and will be found to give excellent results over a wide range of work. The shank may be

centred of the jaws are slotted to clear the adjusting screw in all working positions, and, as will be seen in the drawing, the adjusting screw is provided with a fixed radius-piece at its lower end and a sliding-piece under the tension nut. For light work, sufficient pressure can be exerted



formed from the solid, or it may be built up by brazing the head to the tail portion, as in the original design; in any case, the centre height of the tool should be made to suit the lathe used. Attached to the head of the shank are two forked swinging jaws to carry the knurls, and it will be seen that these jaws are split at their inner ends to allow of adjustment by the clamping bolts, thus ensuring freedom from side-play when the tool is in use. In addition, the holes in the

by means of a knurled finger nut—this can be made as a test-piece when trying out the finished tool—but for heavier knurling, a nut and box spanner, as shown in Fig. 3A, will be found necessary.

To ensure good wearing qualities, the jaws must be case-hardened at least at their outer ends, and the wheel pivot screws should also be case-hardened or made of hardened steel. These screws must be inserted in the side of the tool

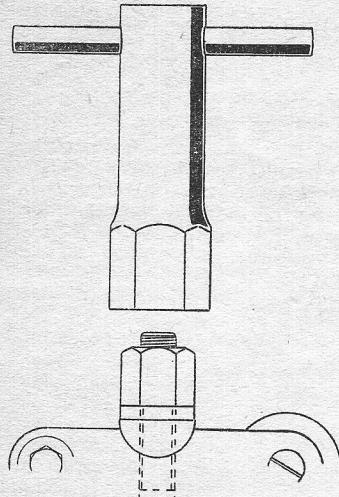


Fig. 3A

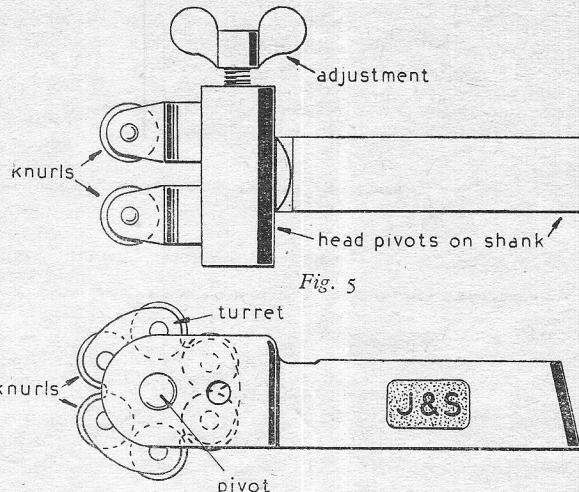


Fig. 5

Fig. 5A

away from the headstock, otherwise they will tend to unscrew under working conditions ; also, the headstock side of the tool should be kept free from projecting bolt-heads which might foul the chuck jaws.

The Billings Knurling Tool

This holder is also made for use in the lathe tool post, but as it is of American origin it may

KNURLING TOOL

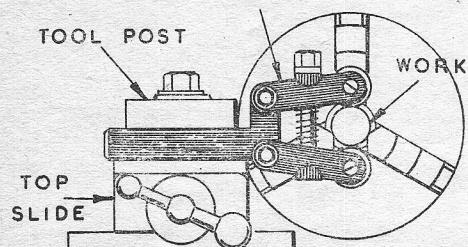


Fig. 4

not be obtainable at the present time. As in the previous type, the two opposed knurling wheels are carried in forked jaws, but in this case the jaws are operated by means of an adjusting screw provided with right and left-hand threads for opening and closing the wheels on the work ; in addition, the tool-head can pivot on the shank in order to equalise the pressure of the knurls

when in operation. Pairs of cross-cut knurls are supplied for the tool in fine, medium, and coarse pitches.

The Jones and Shipman Knurling Tool

As will be seen in Fig. 5A, this is also a slide-rest tool that for quick operation carries three pairs of wheels in a revolving turret-head, which latter allows the knurls to align themselves to the face of the work and with equality of pressure. Towards the rear end of the forked shank, a hole is provided to enable the pivot pins to be punched out if the knurls have to be changed. As previously explained, a tool of this type is suitable for use where the lathe bearings are capable of withstanding considerable radial thrust without detriment, but this pressure can be reduced by using knurls which have a good cutting action and have not at best to be forced into the work.

Hand Tools

So far slide-rest tools only have been considered, but before the present age of quantity production much light knurling was done with hand tools. The writer well remembers that in a laboratory where he worked, special instruments and fittings were made as required by the assistants, and it was the usual practice to knurl brass terminal and finger nuts with a hand-tool in a brass-finisher's lathe, after they had been turned to shape with a hand graver.

Figs. 6 and 7 show the type of tool used, and the method usually employed to maintain adequate pressure on the knurl without tiring the hand. It will be observed that no attempt is made

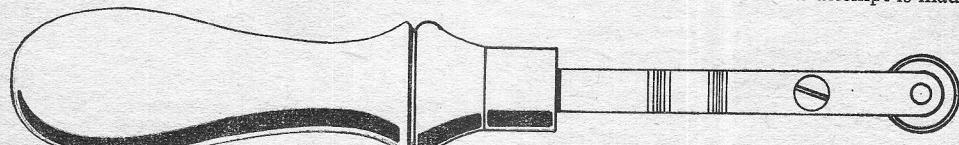
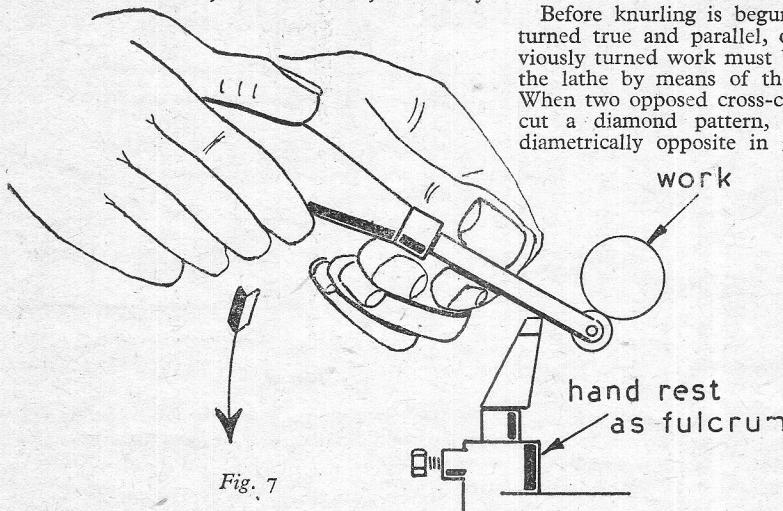


Fig. 6.

to press the knurl directly against the work, as this would have very little effect, but, instead, the lathe hand-rest is used as a fulcrum and the necessary pressure is obtained by leverage. Although this practice necessarily imposes some side-thrust on the lathe headstock, it is as a rule, used only



or dealing with narrow surfaces on brass or aluminium components.

Knurling Wheels

These are usually manufactured with a diameter of $\frac{3}{4}$ in. and with a $\frac{1}{4}$ -in. bore, whilst the standard widths of face are $\frac{1}{4}$ in. and $\frac{3}{8}$ in. In both the straight and cross-cut forms, the pitches normally obtainable are, extra fine, fine, medium, and coarse. Formerly, knurling wheels were manufactured in a great variety of forms to give all sorts of fancy patterns, but these are now standardised in the five types illustrated in Fig. 8.

It should be noted that the pattern generated by the flat diamond knurl is not the same as that produced by two cross-cut knurls working together, but is the reverse of the latter, for the diamond markings formed by the single wheel are impressed below the surface, and are not up-standing pyramids as in the case of the more usual type; nevertheless, the flat diamond knurl gives a pleasing appearance and is useful when light knurling only is required. When purchasing knurls care must be taken to ensure that the bores are to size and well finished, the width of the wheels is exactly standard, and the bore is truly central. Wheels made even by manufacturers of repute have been found to fail in all these respects, and it is irksome to have to lap the bores and reduce the width of wheels to enable them to be used in an accurately made standard holder: moreover, eccentricity of the bore, causing difficulty when knurling, is not at all uncommon. Some time ago, eight best quality knurls were examined by revolving them on a fixed spindle and measuring the eccentricity with a dial test indicator; the least inaccurate showed three thousandths and the

worst seven thousandths of an inch eccentricity; more recently, one wheel of a pair ran true and the other was found to be 25 thousandths out of truth.

Starting the Knurling Operation

Before knurling is begun, the work must be turned true and parallel, or, alternatively, previously turned work must be set to run truly in the lathe by means of the dial test indicator. When two opposed cross-cut knurls are used to cut a diamond pattern, they should be set diametrically opposite in relation to the work, in order, as has already been explained, to avoid causing unnecessary stresses. Only some $\frac{1}{8}$ in. or less of the faces of the wheels should be engaged with the work in the first instance, and, while the mandrel is slowly turned by hand, the knurls are tightened on to the work.

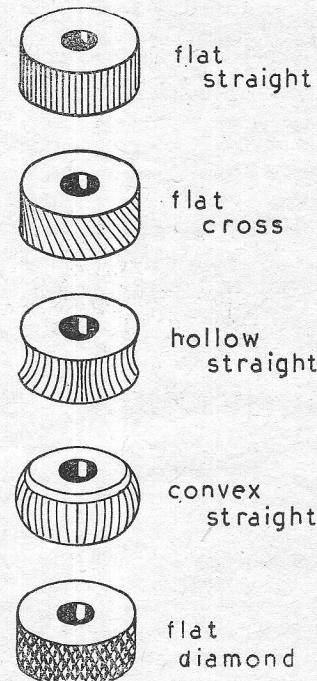


Fig. 8

To observe progress and to see how the knurls are behaving, a dental mirror will be found most useful; for the front of the work is obscured by
(Continued on page 18)

"Minx" Makes Her Bow

by "L.B.S.C."

HERE, as promised, is the outline drawing and first details of a 5-in. gauge 0-6-0 goods tender engine which incorporates the same boiler, cylinders and motion as the passenger engine introduced last week. I guess you'll be wondering why I called her "Minx"; well, it is just a flashback to a snatch of conversation heard in the drivers' lobby at the turn of the century. An old driver had just come in after a trip to Portsmouth

performs, I thought it wouldn't be a bad moniker for her, so I put it on the splasher. Incidentally, it is easy to paint—only four letters,—and all straight lines; but don't go and make the mistake of putting K at the end instead of X, because it might put ideas into the head of your fair lady or girl friend, and you might have to sell the engine to pay the first instalment on a coat!

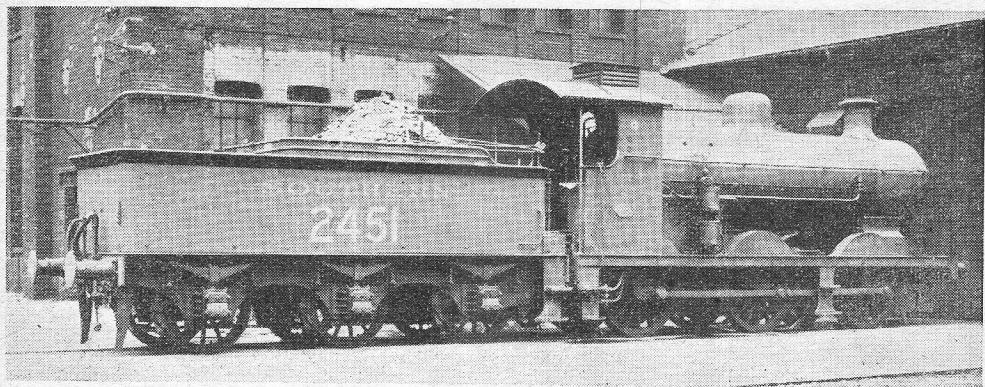


Photo by]

A "Minx" in full size

[C. J. Grose

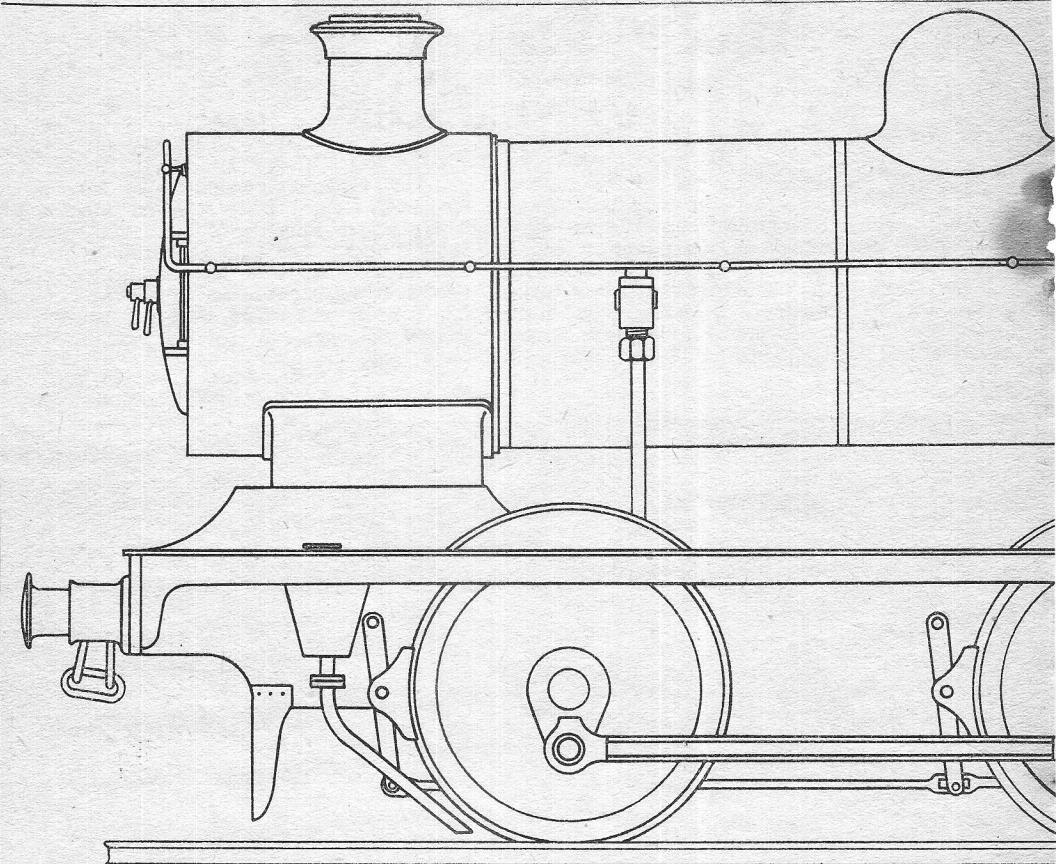
on one of Bob Billinton's Vulcan-built class C engines, and another driver asked him how the engine was going. With a look on his face which would have licked anything that ever came out of Hollywood for withering scorn, he replied "Gorlummy, she's a minx!" The particular engine—I forgot her number for the minute—was known as the "Minx" for months afterwards. Anybody who has had the heartbreaking job of driving a "Vulcan" in its original state, or the back-breaking job of firing one, will agree that calling the engine a "minx" was really praising her—you should have heard some of the terms applied to them!

A Minx no Longer

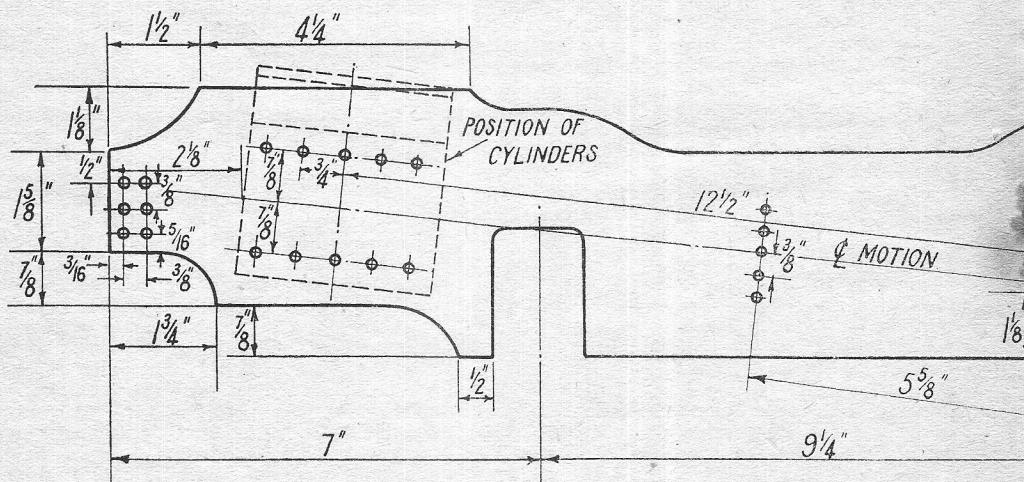
Anyway, in due course, after Mr. Marsh took over the reins at Brighton, the "Minx" went in for rebuilding; and when she left the works, with a new big boiler, and the cylinders and motion titivated up a bit, she was really a minx no longer. Whilst I was getting out the drawing of the little engine, my mind wandered back over the long years, as it usually does when doing anything connected with the old "Brighton" line, and I recalled the incident recorded above. Although the small edition will be anything but minxlike in the way she

General Notes

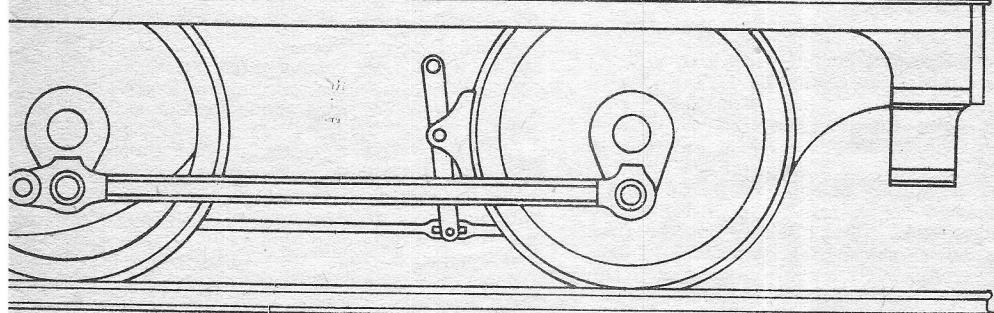
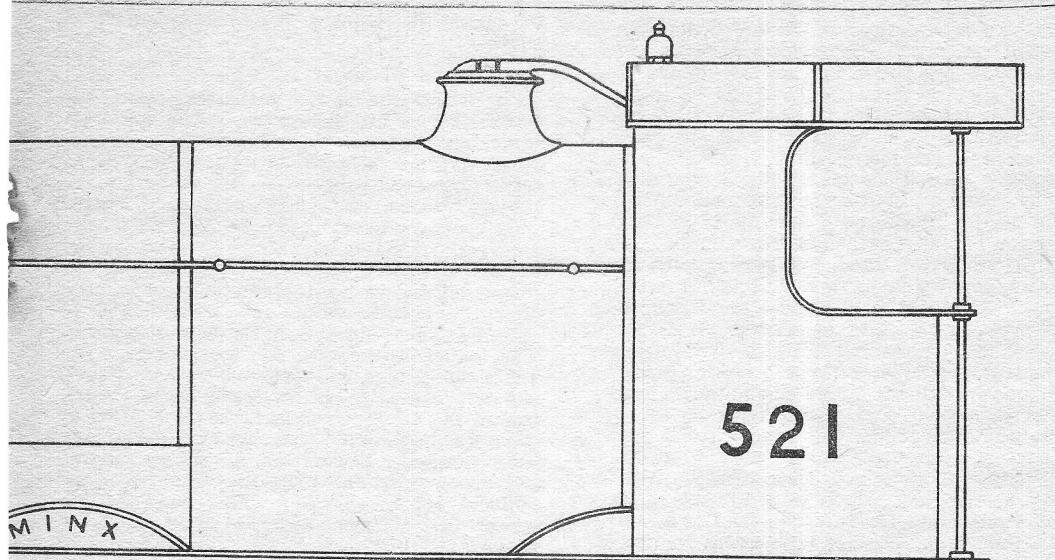
The locomotive is not intended to be a correct copy of the rebuilt Vulcans. I drew in that particular outline because, as mentioned before, Southern readers want to know why I apparently neglected our "home road" in these notes; but the boiler, cylinders, and motion of the passenger engine would not come in for a "true-to-scale" Vulcan. Also, I intended the chassis to be adaptable to any kind of "top works" or superstructure, that the builder likes to put on it; and many of the 0-6-0 "maids-of-all-work" have longer wheelbase, and different size and height of boiler, compared with the Vulcan rebuilds. She is longer than a Vulcan, for reasons mentioned above, and the coupled wheels are smaller, being the equivalent of 4 ft. 8 in. instead of 5 ft., but that is an advantage, especially when the engine has to operate on a comparatively short up-and-down line in a suburban back garden. The boiler is slightly smaller in the barrel than the rebuilds, being equal to 4 ft. 8 in. instead of 5 ft., but is proportionately much larger than the original Vulcan's 4 ft. 3 in. outside the largest ring. Either Belpaire or round-top wrapper may be used as desired; it makes no difference to the inner firebox and tubes.



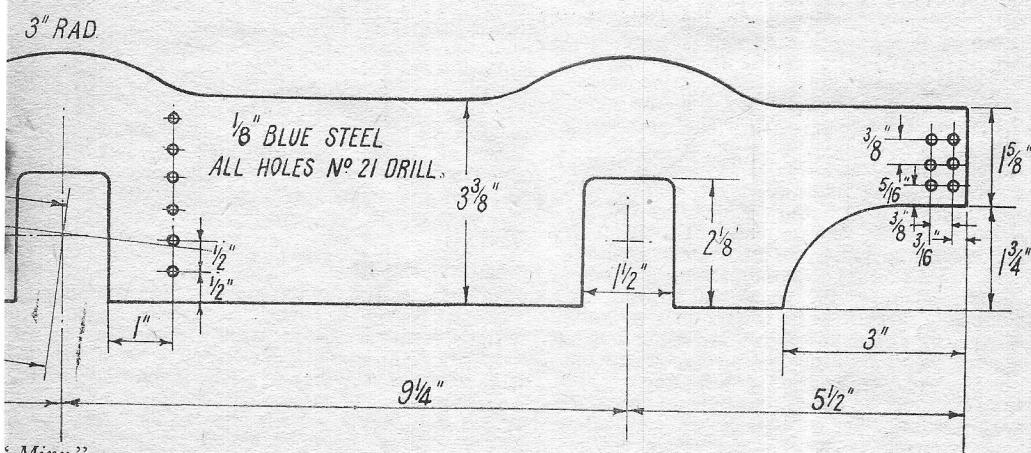
The "Maid's"



Frames for the



goods sister



Fitting in the Cylinders

As will be seen from the frame drawing, the cylinders of the passenger engine work in very nicely, being raised high enough for the guide-bars and crossheads to clear the leading axle. A little bit will have to be filed off the leading hornblocks, to allow the cylinder casting to be erected in correct position. Two alternative valve-gears will be given, Stephenson link and Joy radial; I strongly recommend beginners to use Joy gear, even if they intend to build the engine to represent their pet fancy on some railway that has never fitted Joy gear to any engine. Also, as a beginners' job, "Minx" is preferable to "Maid of Kent," because there is no bogie, the wheels are easier to machine on the average amateur's lathe, and there is less plate-work, and only straight running-boards. Being six-coupled, with the whole engine-weight available for adhesion, and the driving-wheels being smaller, the engine will have a really amazing haulage capacity, much greater than the passenger engine, and consequently a high rate of acceleration, which is a valuable asset on a straight-run, non-continuous line; or for hauling huge loads of children at charity fêtes or other functions.

Main Frames

Two pieces of $\frac{1}{2}$ -in. blue steel 2 ft. 7 in. long and $4\frac{1}{2}$ in. wide, are needed for the main frames; and the instructions given for making the passenger engine frames can be followed generally for the goods engine. Note, however, the difference in the inclination of the cylinders, which, according to my Cleveland drafting machine, are set at an angle of 6 degrees from the horizontal. After marking out the frames to the outline shown, take a point $\frac{1}{2}$ in. below the lower end of the upper curve at the leading end of the frames (where the buffer-beam is attached) and from that, draw a line cutting through the centre of the driving axle. The latter point is $1\frac{1}{8}$ in. from the lower edge of frame, on the vertical centre-line of the middle hornblock opening (see illustration). The centre of the cylinder casting will be exactly $12\frac{1}{2}$ in. from the centre of the driving axle, so at that point draw a line cutting across the centre-line of motion, at right-angles to same. From that point it is a simple matter to set out all the cylinder bolt holes; that was exactly the way I did it myself, but the last laugh is with you, because you didn't have to scheme it all out!

On the same centre-line of motion, at $5\frac{5}{8}$ in. from centre of driving-axle, draw another line at right-angles to it; and on that, set out the five holes for the motion-plate. The holes at either end of the frames, for attachment of buffer-beams, are the same as on the passenger engine; ditto the holes for the frame stay behind the driving-axle. For $5/32$ -in. screws drill the holes with No. 21 drill; and if you are using 3-B.A. and they won't pass the holes, open them out with No. 19, as mentioned last week. The frames can then be cut out together in the usual way, rounding the corners of the hornblock openings, same as for the passenger engine. In order to get a little extra depth of frame over

the hornblock openings, the frames at this point are cut to the radius of the wheel splashes, as shown.

Erection of Frames

As in the case of the passenger engine, the frames may be attached to the buffer- and drag-beams either by riveted and screwed angles, or by brazing or Sifbronzing. The beams themselves are exactly as given last week for the "Maid," so no repetition is necessary. Take the same strict caution as before, to have the frames true and square before screwing them to the angles, if that method is adopted. If you intend brazing or Sifbronzing, don't erect until after the hornblocks are fitted, which will be described, all being well, in the next instalment. The same instructions for hornblocks, axle-boxes and springs, will apply to both the "Maid" and the "Minx." The frame stay can be erected behind the driving-axle, at the same location as given for the "Maid," after the hornblocks have been attached. Sawing out the frames, buffer- and drag-beams, and frame stay ought to keep builders out of mischief whilst your humble servant gets out some more drawings and how-to-do-it!

The Donkey that Wouldn't Kick

When I built "Fernanda," the $2\frac{1}{2}$ -in. gauge 4-6-2 which has piston-valve cylinders and ball-bearing axleboxes, some thirteen years ago, I made a tiny Weir-type donkey-pump as auxiliary boiler feed. It was illustrated and described at the time. This "pocket edition" functioned faithfully until about a couple of months ago, when it started to miss a beat or two when pumping, then became erratic, and finally went on strike altogether. When the steam valve was opened, it would start and perform in the manner usually observed by members of the Amalgamated Association of Donkey-Pumps; then as it warmed up, the action became jerky, finally stopping with the piston at the bottom of the cylinder, with steam blowing from the exhaust. I thought at first it was due to valves sticking off the faces, but examination soon dispelled that idea; the main piston was also repacked, but still the same stalling effect continued, although there was now no blowing from the exhaust. It doesn't need a Sherlock Holmes to deduce that when the piston ceased operations, there could not be any steam behind it to urge it on to further efforts; no steam meant no port opening, and that in turn meant no movement of the shuttle which operates the main valve. As there was nothing wrong with the trip-gear and reversing-valve, the fault obviously lay in the shuttle itself; and so it proved.

"Against the Clock"

At the time I made the pump, I was running "against the clock"—as usual!—and having nothing better at the moment, from which to make the main steam-chest, I used a bit of bar made from the alloy known in the metal trade as "screw-rod." For beginners' benefit I might explain that this is a brass alloy which takes a beautiful thread (hence its name) but is of little use for axleboxes, or any place where wear has

to be resisted ; and I shouldn't have used it if anything better had been available at the time. The holes for the shuttle bobbins at each end of the valve cavity were drilled No. 24 and reamed 5/32 in., and the shuttle itself was merely a piece of 5/32-in. ground rustless steel rod, cut to correct length, with the centre part reduced to fit the slot in the back of the main valve. When the pump is in action, the reversing-valve admits steam to the ends of the shuttle bobbins alternately, pushing the shuttle up and down, operating the main slide-valve and admitting steam to the pump cylinder, just like an ordinary locomotive cylinder.

Well, what "stopped the clock" was easily explained. Close examination of the shuttle-bobbins and the bores in which they worked, revealed the former in good condition, but much wear in the bores, due to the soft and unsuitable metal in the steam-chest ; and a test under air pressure with the steam-chest off the cylinder, revealed a bad blow past each bobbin, reducing the pressure on the bobbins so much that there was not enough to move the slide valve against its ordinary working resistance. Just to confirm this, I smeared the bobbins with cylinder oil, temporarily reassembled the lot, and tried it under air. Whilst the oil clung to the bobbins and made a temporary seal between them and the bores in which they operate, the pump worked well ; but as soon as the oil was rubbed off, she jibbed again.

As you were !

Being still pushed for time—blame the "Maid" and the "Minx!"—I decided to postpone the making of a new steam-chest, for the time being, and try to bush the bobbin-bores, but they already come within 1/32 in. of the contact faces of the steam-chest, so that had to be ruled out of court. The only thing to do, was to ream out the bores and make a new shuttle to fit ; and that was soon done. I happened to have a 5/32-in. parallel reamer that was a shade oversize, so poked that through the bores ; and having a few short ends of jolly good phosphor-bronze small-diameter rod, I put one in the Boley three-jaw, and turned it exactly the same as if I were fitting a piston-valve to a liner. Owing to the small diameter of the bobbins, I only allowed about a quarter-thousandth expansion clearance ; and under air test, with both bobbins and bores perfectly dry, there was no perceptible blow, so I reckoned it was good enough.

A Merry Clicking

The weeny pump was then re-assembled, and re-erected on the locomotive ; and on the following afternoon, the weather being fine, I took her out on the little railway. There was only about 1-in. of water showing in the glass when I lit the fire ; so, as soon as there was about 35 lb. of steam showing on the "clock," I turned on steam to the donkey, and it immediately kicked off in the old original fashion, with a merry clicking like a doll's sewing-machine. The water-level steadily rose as the steam-gauge climbed, and at 70 lb. she had made half-a-glass, and the donkey was putting in some overtime ;

so I throttled it down to a steady tick, gave the engine its usual warming-up run, then took my seat on the flat car and did a couple of miles. During the whole of the run, the donkey fed the boiler "all on its own," the by-pass of the eccentric pump being wide open ; and water-level was maintained at about three-parts of a glass, with the safety-valves on the sizzle all the time, and the firehole door partly open. This engine has the Great Western pattern of Stephenson link motion, and the true (not the published) valve setting of the full-sized engines ; and she ran with the reversing-gear just off middle, a bare half regulator, and a speed equivalent to between 80 and 85 m.p.h.

The Moral

Some good folk will doubtless wonder why I took pains to explain a small fault, and its remedy, in detail ; well, I'll tell you. As most of our readers know, I have a tremendous correspondence list, and a great many of the letter-writers are beginners. Many of them are using a lathe and tools for the first time. They decide to build one of my engines, and go right ahead with it, with a keenness that is admirable, but quite forget that one of the essentials to success is careful workmanship. In their haste to see the wheels turning, some of the machining and fitting that goes into the job, isn't carried out quite as carefully as it might and should be ; and when the engine eventually takes the road, a fault will develop, and they immediately write and tell me all about it, asking what is the trouble, just as if I could see the engine and diagnose its complaint when it is maybe 200 miles or so away ! For instance, a blow up the chimney when the regulator is opened, may be caused by a valve sticking off the port-face ; a badly-faced valve, or scratches on the port-face ; valve spindle nut jamming in the slot, or twisting ; valve spindle too far away from port-face, so that it tends to tilt the valve off its seating ; valve overrunning the exhaust port, due to faulty setting, or incorrect length of rods ; leak, blowhole, or other communication between exhaust cavity and valve spindle slot ; passage-way drilled right into exhaust port ; communication between passage-ways and cylinder bore cut too deep ; faulty piston, either leaking at edge, or around piston-rod (if piston is made from cast metal, it may be porous ; ditto the valve) bell-mouthed or oval cylinder bore ; blowhole in metal of cylinder ; and so on.

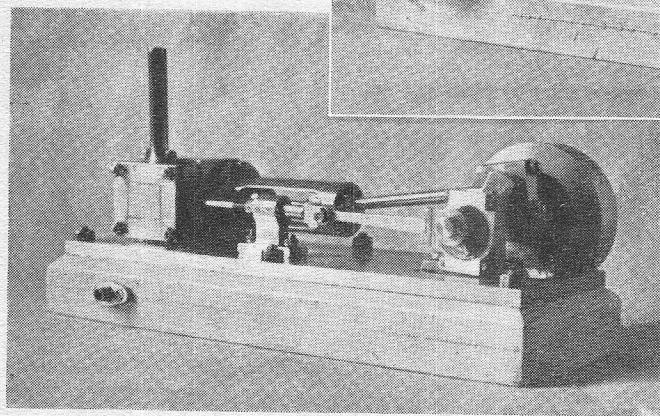
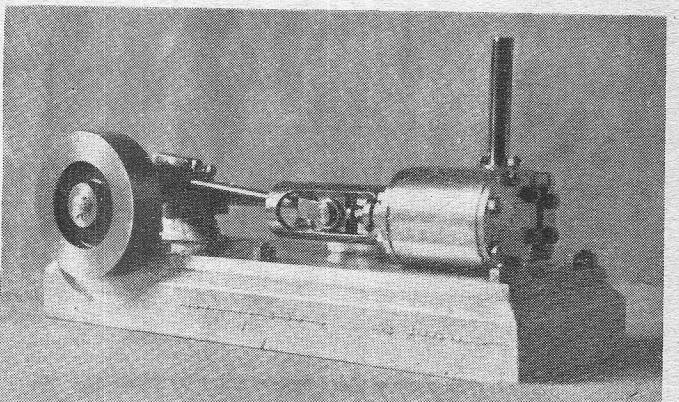
In the case of the little donkey, a "systematic" examination of the working parts revealed the fault in double-quick time ; and if a beginner in difficulties, takes the trouble to check his job carefully, step by step, or piece by piece, he could often discover it for himself, and save both his time and my own. Every effect has a cause, and that cause *must* be located somewhere between the front, back and sides of the engine, so it shouldn't be difficult to unearth !

Fortunately, failures are very few compared with successes ; only a day or two ago I received a letter from a delighted "first-timer" who said he had just steamed his "Lassie" on her first trial run, and she walked off with eight adults—"nuff sed !

A Model Horizontal Engine

THIS engine was built mostly from scraps, with the exception of the flywheel, which was made for me, and various screws, nuts, etc., that were purchased.

The bore is 1 in. and the stroke $1\frac{1}{8}$ in. The cylinder is made of solid brass, the steam and exhaust ports being drilled and cut out of the solid. The usual double-action slide-valve is fitted. The crankshaft is



built-up and is $\frac{1}{16}$ in. diameter; the webs are pressed on and then taper pinned, making a good strong job. The remainder calls for no special comment, as the photographs will show the main features. Should, however, any readers desire further particulars, I shall be pleased to hear from them through the Editor. The photographs were taken by Mr. J. Harris.

—H. M. KENNEDY.

In the Workshop

(Continued from page 12)

the knurl holder and only the back is free. Continue to tighten the knurls until both wheels are making a good impress and the diamond pattern shows clearly. Should doubling occur, that is to say one or both wheels is cutting a pattern of half its true tooth pitch, then the pressure must be increased and if necessary the area of contact reduced until proper cutting in step is obtained. Following the initial turning movement made by hand, the back gear may be engaged, and, as soon as the wheels are seen to be cutting properly, the lathe speed may be further increased and the knurls traversed along the work. Although the knurling wheel spindles should be kept oiled to prevent wear, oil should not be applied to the surface being knurled, as this usually causes the fine swarf to cling and be rolled into the surface of the work, causing a ragged and unsightly finish.

On the other hand, a high-pressure jet of cutting fluid, as is used commercially, will, of course, remove the swarf as it is formed and will maintain a good finish on the work.

It is a good plan to inspect the knurled surface

with a magnifying glass at the end of each traverse, and, as soon as a pointed apex is formed on the little diamond-shaped areas over the whole surface of the work, the machining should be stopped, as otherwise the surface may become torn and ragged. It is well worth while doing some trial work and taking a little trouble to get a well-finished clear-cut pattern, for uneven rough knurling is an eyesore and quite spoils the appearance of any work. To finish off the job after knurling, the edges should be chamfered to some 45 degrees to remove burrs and upset metal, and the general appearance can be enhanced and the finger-hold improved by turning shallow grooves on the surface, particularly in the case of long work. For this purpose, a narrow, round-pointed or a V-pointed tool should be used, and the grooves must be equally spaced by using the leadscrew index or by reference to a change wheel mounted on the end of the leadscrew. In addition, the depth of the grooves, and also their width, must be kept constant by feeding the tool inwards to a fixed point on the cross-slide index.

*Swords into Ploughshares

Hints on the adaptation of "surplus" war material
for model engineering or utility purposes

Uses for Permanent Magnets

by "Artificer"

MANY of the instruments and other apparatus now offered for sale on the "surplus" market contain permanent magnets in some form or other. The most common of these are electrical measuring instruments, telephones and microphones, and small generators and alternators for telephone ringing, speed indicating transmitters, and the like. Magnets are also separately available, such as those which were used for the attachment of "limpet" bombs to tanks and the hulls of ships.

There is no doubt that magnets of all kinds are fascinating things, and apart from their use for elementary instructional principles, they lend themselves readily to the purposes of amusement, and sometimes mystery, in simple magnetic toys. Perhaps the simplest of all applications in the latter respect is the well-known "magnetic fishpond" game, where small magnets are used as "bait" on the fishing lines and used to "hook" tin fish. A more sophisticated but equally elementary modern application is to be found in the "magnetic dogs" which insist on facing each other. Many years ago, an even more interesting and mysterious toy was made, in a variety of forms, in which the magnetic principle was used to tell fortunes and answer questions.

But toys, however fascinating, are hardly within the scope of present discussion, and most readers will be interested in the more serious application of magnets—in the workshop, and in connection with model construction. Here again, magnets need not necessarily be considered as a corporate part of apparatus, but are quite useful on their own. No engineer needs to be reminded how useful a magnet is for finding screws, nuts and other minute objects when they are dropped on the floor, or in some inaccessible place, such as inside a crankcase or oil tank. In

the latter case, the smaller sizes of magnets are generally the most useful, though it is probably not so well known as it might be that a large magnet may readily be equipped with a temporary "extension pole," in the form of a wire nail or similar iron rod, to get into places too small for the whole magnet to enter. The writer has

successfully used a large magneto magnet in sweeping operations on an extensive pond to find a valued propeller which had been lost from a model power boat. It may be mentioned that not only was the quest eventually successful but about half-a-dozen more propellers and other ironmongery, in various stages of disintegration by rust, were also salvaged from the murky depths!

Of course, in all the applications of magnets for reclaiming lost prop-

erty, it is essential that the latter should be of iron or steel; if it happens to be of brass, copper or aluminium, that is just too bad! The same applies to the use of magnetised screwdrivers and other tools used for picking up tiny screws and other parts. These are often used or recommended, but from the writer's experience, they are sometimes as much trouble as they are worth, as the tools will pick things up all right but don't know when or how to leave go. The infectious properties of magnets may often be a cause of trouble in the workshop, by magnetising files and cutting tools, for although it is not correct to say that tools are "spoiled" by becoming magnetic, it is embarrassing to have to be continually removing "iron whiskers" each time they are used or ground.

Magnetic separators, for removing iron and steel swarf or particles from other materials, are widely used in industry, and may also be useful in the model workshop; their principles are too simple and obvious to call for detailed explanation. Of recent years, the same method has been applied in magnetic filters, for removing ferrous dust from lubricating oil, or from the coolant used on machine tools.

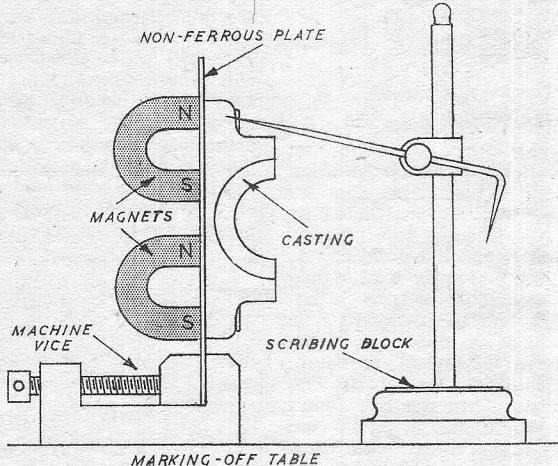


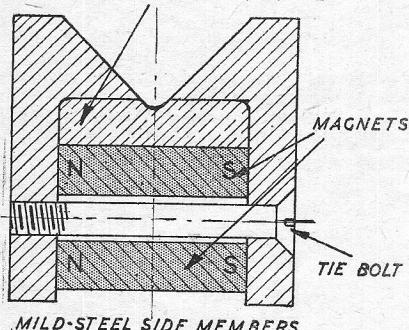
Fig. 1. Showing how magnets may be used to hold iron castings for marking-out

*Continued from page 671, "M.E.", Vol. 97,
December 18, 1947.

High Efficiency Magnets

In the applications so far considered, the actual efficiency of the magnet is not necessarily a prime factor in its success for the intended purpose ; but in some cases, the necessity arises for using a magnet having the utmost strength in relation to its size or weight. Many of the magnets available on the "surplus" market are of modern

NON-FERROUS FILLING PIECE



MILD-STEEL SIDE MEMBERS

Fig. 2. A simple magnetic vee block

magnet steels, containing cobalt, or aluminium and nickel, which enable a very high concentration of flux to be obtained, and such magnets are suitable for duties which were impracticable only a few years ago.

One such application is the magnetic chuck, which demands a holding power far greater than that obtainable with the older magnet steels, but is fully practicable with the materials now available. A small chuck of this type, using three of the well-known "Eclipse" miniature magnets, was described some years ago in THE MODEL ENGINEER ; some of the magnets found in surplus apparatus would enable larger and more powerful chucks to be constructed. For instance, the annular, axially-magnetised ring magnets, or "pot" magnets, either cast solid or built up, as used in loud-speakers and other sound reproducing apparatus, will hold a steel disc sufficiently firmly to enable light cuts to be taken off it in the lathe ; an invaluable facility when it is necessary to produce a truly parallel face on both sides of a thin component which cannot readily be chucked.

In most simple forms of magnetic chucks, it is not easy to provide means of "switching off," which is done in the industrial permanent-magnet chucks by short-circuiting the magnet poles ; the only way to remove the work from the chuck, in such cases, is to slide it off the magnet face. This may require quite a substantial force, but the operation may sometimes be made easier by diverting the magnetic force, by sliding another piece of steel on to the magnet at the same time.

A somewhat similar application of one or more magnets may be useful in the temporary assembly of components, or when marking-out iron castings for machining (Fig. 1). For instance, a whole group of components assembled on an aluminium or brass plate may be held sufficiently firmly for many practical purposes, simply by powerful magnets at the back of the

plate. The entire assembly may then be moved bodily, placed in a horizontal, vertical, inverted or oblique position, without any fear of the parts shifting from their relative locations.

As a further elaboration of this idea, small but powerful magnets may be built into packing blocks and angle-plates, or into the base of a height gauge, square, or surface gauge used on the marking-off table. Magnetised vee-blocks, adherent both to the drilling-machine table and the work, will hold small pins firmly enough to allow of drilling cross-holes in them to take cotters or split-pins (Fig. 2).

In the drawing office, a very successful application of one or more permanent magnets is in holding the tee-square firmly against the edge of the drawing-board. It is, of course, necessary to face the latter with a strip of steel, which must be quite straight and true, and the magnets may then be attached to the underside of the stock of the tee-square, or let into it. Unless the magnets are of abnormal (and unnecessary) strength, the resistance of the tee-square to sliding along the strip will not be inconveniently increased, but it will require considerable force to tilt the stock away from the edge of the board. This is a great advantage when it becomes necessary to manipulate set-squares and protractors in conjunction with the tee-square (Fig. 3).

There is at least one well-known application of a permanent magnet which should be approached with the very utmost caution, if at all ;

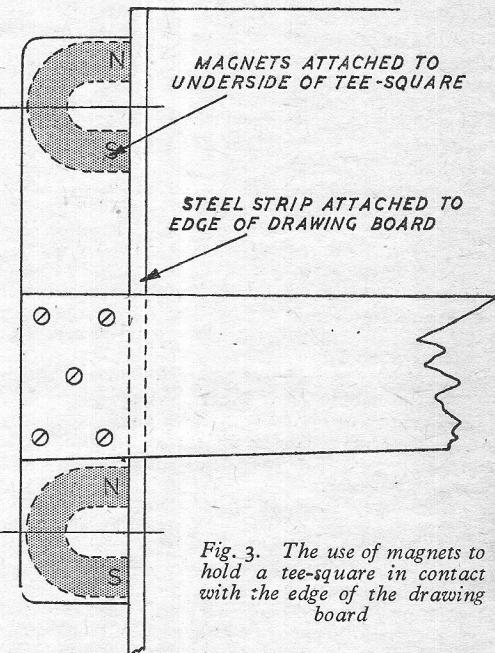


Fig. 3. The use of magnets to hold a tee-square in contact with the edge of the drawing board

namely, the removal of steel splinters from the eye, which is sometimes recommended by those helpful, but often optimistic writers of workshop hints and tips. Such instruments are often used with great success in ophthalmic surgeries, and although electro-magnets are most popular,

a high-efficiency permanent magnet is sufficiently powerful to be useful. An article recently encountered described in detail the construction of an electro-magnet for this specific purpose.

The use of any magnet for this purpose, however, in any but specially trained and highly skilled hands, is strongly discouraged, as it may result in serious and irreparable damage to the eye. For instance, the splinter may enter the eye at an acute angle, or may have a barb on it like a small fish-hook ; in such cases, it is easy to see what harm may be done by forcibly tearing it out at whatever angle the magnet is presented to it. Readers will be well advised to leave an operation of this nature to someone who really understands it.

Telephones and Microphones

It is hardly within the scope of these articles to discuss all the ways in which these may be used ; some of them will be fairly obvious, especially to readers interested in radio or telegraphy, but as magnets are extensively used in them, it is appropriate to make some mention of them. Numerous types of these instruments, including earphones, loud-speakers, speech transmitters, etc., are to be found at "surplus" stores, and are in some cases cheap enough to be worth while buying for the sake of the magnets alone.

Most of the older types of telephone receivers embody relatively weak magnets, which are of little use for anything but their original purpose, though some years ago the writer succeeded in constructing a pocket tachometer (speed indica-

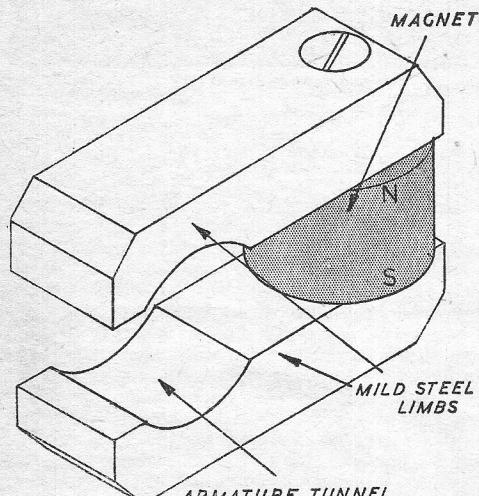


Fig. 4. Cylindrical or disc magnet used in built-up field magnet of miniature motor. (Note : the armature tunnel may be bored axially instead of transversely, as shown)

tor) of the "magnetic drag" type from an old earphone case and magnet, in conjunction with the hair spring and balance wheel of a cheap watch. But many modern earphones and other receivers are of the moving-coil type, embodying very efficient "pot" magnets which can be put to many other uses. The moving-coil principle

is also used in microphones and telephone transmitters in place of the older carbon granule type. The magnets in these instruments may be utilised in the construction of tiny electric motors, such as used for driving model locomotives in the ultra-miniature gauges. Most of the magnets are magnetised axially, and in this

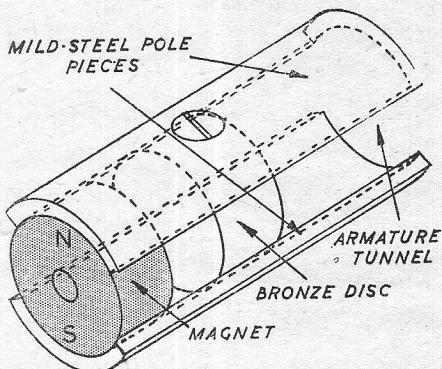


Fig. 5. An alternative arrangement, using a diametrically-magnetised permanent magnet (length of pole-pieces exaggerated for explanatory reasons)

state may be used as the yoke of the field magnet, the limbs and pole-pieces being of iron ; as in Fig. 4, but sometimes it is more convenient to re-magnetise them across the diameter, for use in field magnets of different design, as in Fig. 5. Some types of modern magnet steel, however, can only attain proper efficiency when magnetised in the plane for which they were originally designed.

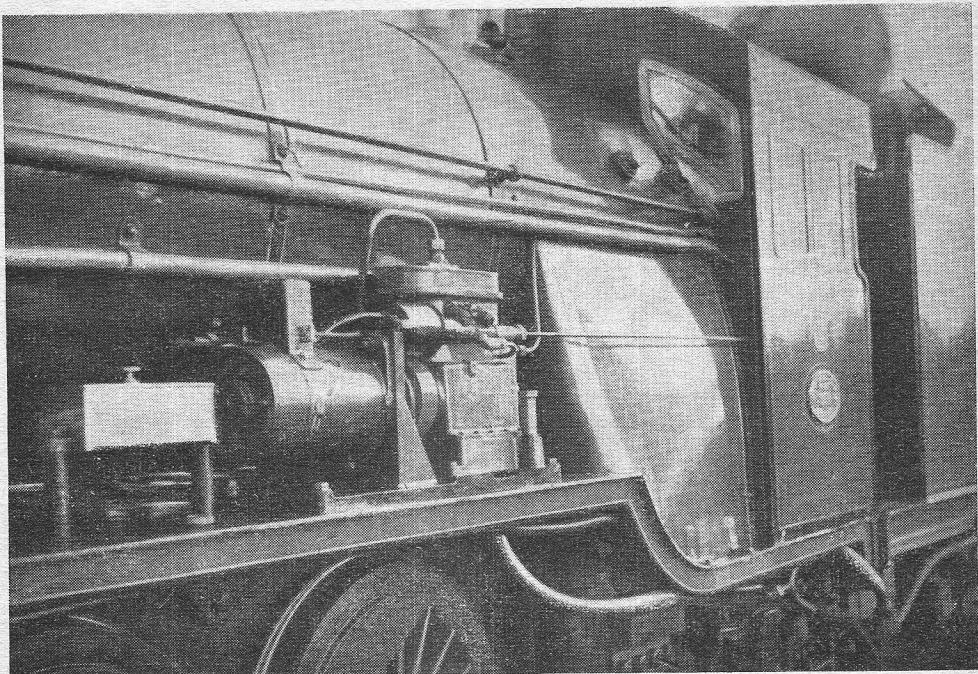
One application of the telephone in the workshop, which deserves far more consideration than it has hitherto received from engineers, is its use as a sensitive listening device, comparable with the doctor's stethoscope. With its aid, one can detect otherwise inaudible sounds, such as scraping in a bearing, or knocking in an engine, and discriminate between normal and abnormal mechanical noises without difficulty. The combination of moving-coil microphone and earpiece, which does not require the application of any external electrical energy, is very convenient for this purpose, as it is self-contained and always ready for use ; but the more common telephone transmitter and receiver can also be used, and will usually work quite well on a single dry-cell. In some cases, a potentiometer or variable rheostat in the circuit will enable the instruments to be adjusted to the condition of maximum sensitivity. The device known as a "throat microphone" is extremely useful for this purpose, as it can be placed in direct and close contact with the machinery being tested.

Of the many uses of permanent magnets in small generators and motors, numerous examples of which are to be found on the "surplus" market, space does not allow of a detailed survey, but any specific advice which readers may require on this subject will be furnished, if considered of general interest.

(To be continued)

From Parachute to Locomotive

Advanced Lighting Equipment on the "R.H.D.R.'s" "Hercules"



Close-up of the generator on "Hercules"

DURING the war the Service authorities found it necessary to have a generating plant for battery charging which was completely self-contained and independent of normal fuel supplies. After much research, such a set, consisting of a small steam-driven generator and pot-boiler, was produced in large quantities. These were then dropped by parachute to chosen units of Partisan forces throughout Europe.

With the advent of the oil-burning locomotive in this country, provision of electric lighting on footplates, for boiler gauge illumination and other applications became necessary, and the "air-borne" set was developed to the design of the N.C.K. Products by Messrs. Stuart Turner of Henley-on-Thames into a much larger generator of the automatic voltage-control type, coupled directly to the steam engine.

The first of these locomotive lighting sets to go into active operation has now been installed on the 4-8-2 locomotive *Hercules* on the Romney, Hythe and Dymchurch Railway, the famous 15-in. gauge light railway running between Hythe and Dungeness. This locomotive is used for hauling heavy ballast trains at night, and hitherto considerable delays have been caused by straying cattle and other obstructions left on the line—not to mention the great number of

level-crossings which have meant constant stopping.

On Saturday, October 4th, the last train from Hythe—marking the closure of the summer passenger-carrying season—was operated by *Hercules* in the hands of its usual driver, Bob Hobbs. *Hercules* was provided with a powerful headlight (whose beam was seen for a distance of five miles across Romney Marsh), cab illumination and the customary code light indicating a stopping train. All this equipment was powered by the steam-driven generator set "floating" a Nife nickel cadmium alkaline battery mounted on the running-plate on the opposite side to the generating set.

One important feature of this equipment is that it is not necessary to run the generator at all times, as the Nife battery provides a reserve of illuminating power. The steam generating plant itself is unique in that it has a medium-speed reciprocating engine requiring only a crack of steam to operate it at full load, any appreciable additional load on the boiler thus being avoided. The working pressure is only 50 lb., which in the case of *Hercules* is achieved by using a M.I.L. steam trap in reverse as a reducing valve, there being no room on the locomotive to install a standard reducing valve.

Our Anniversary Post Bag

Many of our friends have been kind enough to send us a few lines of greeting on this notable milestone in the history of the "M.E." We quote from their letters with our grateful thanks for their good wishes and kindly thoughts.

Dr. J. Bradbury Winter writes :—

"Nobody can beat my record as a subscriber to THE MODEL ENGINEER, because it dates from the first number in January, 1898, to the present time, fifty years of steady improvement in the contents of this friendly journal. But it is not merely the printed words and illustrations that call for comment ; of far greater importance is the brotherhood of readers, literally in every part of the inhabited world, which has been created by its intimacy and friendliness. Many thousands of members of that brotherhood are constantly meeting each other as strangers, but by the magic freemasonry of model engineers, within two minutes they are talking thirteen to the dozen like old friends. I should like to emphasise two outstanding dates : (1) The day when you irrevocably made up your mind to launch out on the venture, even against the advice of your greatest friend, who was frightened of the risk. (2) The day when you decided to ask "L.B.S.C." to start a non-stop weekly contribution. I am sure you have never regretted either of those two decisions. Long live the "M.E.," its founder, and its unique contributor."

William John Tennant writes :—

"Congratulations on the fiftieth anniversary of the 'M.E.' and on your keeping the flag flying through the stress and strain of two world wars. I have a great admiration for the enthusiasm and fine craftsmanship of model engineers, and in their love of the locomotive and mechanism in all its forms, I find myself on common ground. As a constant reader since No. 1, I have found something of interest in every issue."

James C. Crebbin ("Uncle Jim") writes :—

"Fifty years ago this month I placed an order for a copy of the first issue of THE MODEL ENGINEER from a firm in Old Broad Street, E.C. Little did I realise that I should be spared to pen you my congratulations on the Jubilee of the journal and to thank you for the inspiration which prompted its advent. Neither did I appreciate that the journal was to mean so much in moulding the future of my life. First of all it meant a life-long friendship with yourself : then members of your family dubbed me 'Uncle Jim,' a name which has spread to most parts of the world and in consequence has brought me into touch with many unofficial nephews both old and young. Their kindly letters and associations has brought me much happiness and goodwill. Secondly, under your guidance, the 'M.E.' brought about that great institution 'The

Society of Model and Experimental Engineers' which has done so much in not only developing model engineering but in fostering friendships wherever a model engineer is found. The outstanding impression I have received during these fifty years is the genuine modesty of the great craftsmen of model engineers. I quote just a few, namely Dr. J. Bradbury Winter, The Coates Brothers, Mr. Chas. L. Palmer of U.S.A., Commander W. T. Barker, Mr. W. H. Dearden, Mr. A. W. Marchant. These gentlemen were always more willing to help and encourage the less skilled than to discuss their own achievements unless it be to enumerate their failures. To me this is an example of the true spirit of model engineering. Then, of course, we owe much to the experimental model engineer. M. G. M. Suzor, for instance, would never have created such reliable speedboats if he had not carried out many experiments on an original basis. Many great inventions have been the result of experiments. I hope that you may be spared many years to lend your valuable aid in encouraging the experimental side of model engineering. In conclusion may I wish all model and experimental engineers a Happy and Successful New Year."

J. N. Maskelyne writes :—

"I cannot let the fiftieth anniversary of THE MODEL ENGINEER pass without sending a personal note to you, Mr. Marshall. First, I would add my heartiest congratulations to those which I know have reached you from readers everywhere ; and nobody more truly deserves such plaudits. Secondly, I am very deeply conscious of the debt of gratitude that I owe you. I first became acquainted with THE MODEL ENGINEER in 1903, when I was eleven years old and keenly interested in models. There was a friendly, personal quality about the magazine which attracted me, and, before long, I came to regard the editor, and many of the contributors, with awe and wonder. I had no idea then that I should ever be actively associated with any of them ! In 1923, my opportunity came ; for in that year, not only did I meet you personally for the first time, but I met other model engineers whose names were thoroughly familiar to me and whose work I had hitherto admired chiefly through your pages. In the same year, too, you allowed my own name to appear among the galaxy of contributors to your pages, and I was happy. Eleven years later, you did me the honour of finding me a place on your permanent staff, and thereby put me among the few but supremely fortunate people whose hobbies become their professions. The friendship which has matured between you and I during the past twenty-five years is a powerful high-light in my life, and must ever remain the most potent incentive behind whatever future efforts of mine may be required in the service of THE MODEL ENGINEER."

W. J. Bassett-Lowke writes :—

"How quickly fifty years pass! Especially when we are keen on our work I am sure this must apply to all model enthusiasts. I well remember the first small announcement I made in THE MODEL ENGINEER: it was for castings, parts and boiler fittings for model-makers and since then you and your publication have always been ready to offer me assistance through half a century. From the beginning I have always felt you to be my close friend, adviser, and comrade in what I still think is one of the most fascinating and interesting hobbies. May it continue to keep us both young!"

Herbert Sanderson (Stuart-Turner Ltd.) writes :—

"We just can't supply model goods yet, for we have to do all we can for export and the bigger engines and plants are so much more valuable for conversion into dollars. It makes me rather sad. My private view is that THE MODEL ENGINEER is just as good a paper as ever. It is very different from the first issues, but so it should be. Anyway, I can thank you and your colleagues for many happy hours—and do.",

A. W. Purchas writes :—

"The 'Smoke Rings' of November 20th makes me, at last, find time to write and pay tribute to the help and pleasure which you have given me through life. During the four years of '39-'45, while in the Army, I used to feel very grieved that I could not buy THE MODEL ENGINEER, to cheer me up. You must have helped many other professional engineers during their student days and given pleasure to some hundreds of thousands. A truly great life's work. Many thanks from one of those thousands."

Dr. E. V. Beaumont writes :—

"When I read your 'Smoke Ring' suggestion that readers might like to send some form of greeting for your fiftieth birthday I felt a twinge of conscience. The little paper and the hobby it represents have always been a prominent feature on the sunny side of my life's ledger, and I think I have read it ever since I could read, but so far all I have contributed to it is a drawing and a description of a mediocre crankpin turning gadget. I am therefore sending some photographs of a little boat I designed and built specially for a shallow weedy river in the hope that you think they will be of interest." [These will appear later.—ED., "M.E."]

Edgar T. Westbury writes :—

"I cannot claim to have been a reader of THE MODEL ENGINEER 'from No. 1 onwards,' my first introduction to it being in about 1906 when my schoolmaster presented me with a copy as a sort of unofficial good conduct prize. One of the first things that caught my eye in this issue was a description of a model petrol engine, and my ambition from that moment was to produce an engine of this type which would be worthy of a description in THE MODEL ENGINEER. It was not until nearly twenty years later that this ambition was realised, but I have since produced many more engines of very widely

varied type and size, nearly all of which have attained a similar distinction. While I am interested in all kinds of models, and have built many things beside petrol engines, I still regard them as offering the best scope for good workmanship and experimental work. The progress of the model petrol engine, especially during the last few years, has been remarkable, and in all phases of its development, THE MODEL ENGINEER has played an important part by publishing up-to-date articles and encouraging discussion of technical problems in this field. We have, as yet, only touched the bare fringe of the possibilities offered by the small i.c. engine, but sufficient knowledge has been accumulated to enable any novice who can use tools to produce an efficient and reliable engine; and the cause of progress is more ably served by the modest efforts of the beginner than by a few meteoric achievements by isolated experts. May THE MODEL ENGINEER long continue to keep not merely abreast, but ahead, of the times in this and all other branches of amateur craftsmanship and technical enterprise."

G. R. Hill writes :—

"THE MODEL ENGINEER reaches its fiftieth birthday. This is indeed a very proud record and I should like to extend to you in particular, and your staff, my personal congratulations on this great achievement. THE MODEL ENGINEER, controlled and guided by yourself, and the twenty-two exhibitions so far held since the inauguration of the journal are a monument to perseverance and enterprise, and you must be proud indeed in your realisation of a great job well done over fifty years. In 1946 you were kind enough to approve of my giving your name to a 4-in. scale locomotive as an expression of my appreciation of your great work in promoting and fostering the best hobby in the world and thereby establishing a great brotherhood."

Arthur P. Isard, A.M.I.Mech.E., writes :—

"I think I must be one of your oldest readers, or anyway, among the oldest, the first issue I had was in the early part of 1901 I think, I certainly remember quite well the encouragement in those early days when you were good enough to publish descriptions of various odds and ends of mine, not to forget awarding me a Gauge in your Gauge Competitions. It was very many years before I dared to show at the Exhibition but there may be one aspect you would not quite approve, and that is that I have always been a 'lone hand' and never joined any club or society, although I have been pressed to do so at times. This is probably due to a natural shyness and the strong feeling of independence; I do not know. But I prefer on the whole to work by myself alone, and if one comes up against anything one does not understand or know the answer to, then one has to think it out by force and use one's own resources, if the job is to be done. The 'M.E.' has been a great educator quite apart from any hobby point of view, and may I add that you yourself have been to me a very great friend to whom I have often appealed and never been without benefiting from most useful and sound advice."

William H. Evans writes :—

" Fifty years of THE MODEL ENGINEER—97 volumes ; 2,431 issues ; more than 40,000 pages !—A great achievement between you, your contributors and the great family of readers ! I'm happy to have been closely connected with its publication for the past 40 years, first in a clerical capacity, to be followed as draughtsman and editorial assistant, and now on the production side. During those years some thousands of articles, drawings, photographs, letters and club reports have passed through my hands, destined to fill the pages of THE MODEL ENGINEER. Many of the authors have been personally known to me, others I have not yet met. But to all I would say that it has given me the greatest interest to have a share in preparing their material for the Press, and I would like to thank them for their helpful and friendly co-operation at all times. My thanks also to our printers, without whose efficient service this material would not be so promptly available to our reader public. May the years to come continue to bring me so many agreeable contacts. You, Mr. Marshall, have been a wonderful, fatherly chief to me through all the years ; I have always been very happy in my work with you. May you be spared in future years to help and guide your great family of model makers the world over."

Ben H. Wainwright writes :—

" Allow me to congratulate you on the forthcoming Jubilee of your publication, the one and only THE MODEL ENGINEER. I have been browsing over its pages for nearly fifty years and have got 'em all with the exception of one volume, so you can tell I occupy some room for books. The great changes that have taken place in the model world in that time are very great. One thing that one misses are the old-time advertisers of supplies. But it is the same with big scale engineering, great strides have been made in the same time, methods of power generation and distribution, all sorts of new machine tools, high-speed steel, etc., etc. Although one feels at times as if a little more leisurely approach were made to things we should be no worse off at the end. All the very best wishes."

Stanley R. Best, M.Sc., A.R.I.C., F.C.S., writes :—

" I observe with great pleasure that on January 1st you mark the fiftieth anniversary of the publication of THE MODEL ENGINEER. This in itself is a matter for congratulation, more so that during the wars, you and your staff have, by superhuman endeavours, maintained a service that is unique and unfailing. I am the proud possessor of every number you have issued, and still find pleasure in browsing over the early numbers from time to time. My hope is, that all your readers will continue to derive as much inspiration and happiness as I have done in my study of your periodical, coupled with the friendship you have shown to us all, known or unknown. If ever a man did a good job of work, you are the man, and may you long be spared to make the world a better place for having lived in it."

Sydney A. Walter, M.I.Mech.E., M.I.A.E., writes :—

" It was a very fortunate occurrence for model engineers when, fifty years ago, 'P.M.' founded THE MODEL ENGINEER. It was, I believe, the first regular journal to deal exclusively with the hobby, and it rapidly grew to become an authority. Apart from a few enthusiasts who before that period were very much 'lone hands,' model engineering as a recreation seems to have been practically non-existent, and the 'M.E.' did a very great deal to foster it in the early days of the century. Some of the original numbers look somewhat strange now—especially the prices of the lathes and other tools advertised!—but from the beginning Mr. Marshall set himself out to produce a friendly, helpful and interesting journal which would supply the needs of the craftsmen of all ages. Experts or tyros were equally welcomed in its pages, and under the capable leadership of 'P.M.' a big international brotherhood of model engineers has grown up. The best wishes of all of them all over the world go out to him, and I speak for them when I hope that he long continues to please us in the future as he has done so well in the past."

The Sheffield and District Society of Model and Experimental Engineers writes :—

" On behalf of the members of the Sheffield S.M.E.E. I should like to express our pleasure and congratulations at the Jubilee of THE MODEL ENGINEER. With this must be coupled thanks to Mr. Percival Marshall, who had the vision and courage to launch his new venture, which has for so long been one of the cornerstones of our movement. There are many fine models which must owe much of their quality, and some, indeed their inception, to ideas, help, and knowledge gained from its varying contents. To club-member and lone hand, tyro and expert, the pages of THE MODEL ENGINEER are full of constant interest and inspiration, and it is good to know that our magazine will carry on the good work. Here's to the next half-century!" —
W. J. HUGHES.

W. D. Hollings (West Riding "Live Steamers") writes :—

" May I, as a regular reader of THE MODEL ENGINEER since 1905 (42 years) write a few words about what is, in my opinion, an achievement without equal, in a branch of journalism unique in itself. The near century of volumes of the 'M.E.' can, I think, be regarded as the 'gospel' for model engineers everywhere ; to be delved into again and again for good news, inspiration and encouragement. It is truly a mine of helpful instruction, a monumental record of the achievements of many hundreds of ordinary men and some women too ; a record of the development of the hobby of model engineering, call it what you will ; the study and practice of which, as a recreational pastime has been proved and recorded over and over again to have brought many benefits to the individual, and in a wider sense, to the community as a whole ; yes, world wide, if you like. What is the secret of this success ? I think this is to a large extent, not due to the mere

recording of data, technical instruction or experiment, as such, but the way in which the personalities behind the magazine have been 'put across,' not in a one-way traffic sense, but on the contrary I think it is 'two-way.' THE MODEL ENGINEER can be regarded as a 'mirror' or reflector of all that is best, be it models,

instruction, or personalities in model engineering, here, there and everywhere. May it long continue to flourish and to foster that feeling of good and intimate fellowship."

[A further selection of Anniversary letters will appear later.—ED., "M.E."]

Club Announcements

Eltham and District Locomotive Society

The next meeting will be held on Thursday, January 1st, 1948, at 7.30 p.m. at the "Beehive Hotel," New Eltham, which will be an open night.

The conditions concerning the Locomotive Championship Cup have now been drafted, and will be available later.

Hon. Secretary : F. H. BRADFORD, 19, South Park Crescent, Catford, S.E.6.

Wolverhampton Model Engineering Society

The next special meeting to be held by the above society, has been arranged for Tuesday, January 6th, 1948, in the Assembly Room, Public Library, Snow Hill, Wolverhampton, at 7.30 p.m. prompt. On this occasion a talk will be given by Mr. E. Storr on the subject "Tube Manufacture" and will be illustrated by lantern slides. A cordial invitation is extended to all readers of "ours" and especially to the members of the West Midland Model Engineering Society.

Hon. Secretary : C. HOOD, "Eamont," 72, Canterbury Road, Penn, Wolverhampton.

Hastings and District Society of Model and Experimental Engineers

Meetings of the above society are held on the first Tuesday of each month at 7.30 p.m., at 212a, Battle Road, unless members are notified otherwise, as we are negotiating for other premises.

January. President's Address.

February. Lecturettes by members. (Ten-minutes each.)

March. The Brains Trust in session to answer any questions. Representing boats, locomotives, workshops and general. No questions in advance.

Power boat meetings continue to be held every Sunday at 10.30 a.m. in Alexandra Park.

Hon. Secretary : L. J. MARKWICK, 577, Bexhill Road, St. Leonards.

South Eastern Association of Model Engineers

The meeting of the above association will be held at Kent's headquarters, Crantock Road, Bromley Road, Catford, S.E.6, commencing at 7.30 p.m. sharp on Tuesday evening, January 13th.

The subject to be dealt with will be tracks, when it is hoped to arrive at the design of the most suitable portable track for the various clubs.

Each of the twenty member clubs are asked to make a very special effort to attend and bring along ideas and suggestions together with particulars of their existing track.

If time permits, the question of the 1948 joint exhibition will be brought up.

Hon. Secretary : W. R. COOK, 103, Engleheart Road, Catford, S.E.6.

Leicester Society of Model Engineers

The first meeting in 1948 will be held on Tuesday, January 6th at 7, Wellington Street, at 7 p.m.

A talk on "Pattern Making" by Mr. C. H. Horrocks, member, is the high spot of the meeting, and, as the lecturer is a professional pattern maker, we can look forward to an interesting evening.

Cordial best wishes and continued success in 1948 to all our friends, members of other societies and lone hands.

Hon. Secretary : E. DALLASTON, 67, Skipworth Street, Highfields, Leicester.

Romford Model Engineering Club

Thursday, January 1st, 1948. Competition Night.

Thursday, January 15th. Annual General Meeting.

At the Lambourne Hall, Western Road, Romford, at 8 p.m.

Hon. Secretary : FRANK E. MARKHAM, 38, Kent Drive, Hornchurch.

The Northern Association of Model Engineers

The annual general meeting of the Northern Association will take place at the Milton Hall, Deansgate, Manchester, at 2.45 p.m., on Saturday, February 7th. Members please note that nominations for council must be in the hands of the Hon. Secretary, MR. DUCKITT, 145, Bowring Park Avenue, Liverpool 16, by January 17th.

NOTICES

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The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. All such correspondence should be addressed to the Editor (and not to individuals) at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall and Co. Ltd., 23, Great Queen Street, London, W.C.2.

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"THE MODEL ENGINEER" SALES AND WANTS

Private: Threepence word. Trade: Sixpence word. Use of Box: 2/6 extra.
Minimum charge 3/-

NOTE TO ADVERTISERS.—Pressure on advertising space is so great that no guarantee as to date of insertion can be given.

TOOLS & WORKSHOP

Buck and Ryan's Department for Lathes, Drilling Machines, Grinders, Electric Tools, Chucks, Surface plates, Lathe Accessories and Tools.—310-312, Euston Road, London, N.W.1. Telephone: EUSton 4661. Hours of business: 8.30 to 5.0 p.m., Monday to Friday; Saturday 1.0 p.m.

"Little John" Lathes. Sole Selling Agents for Home and Export. Send for illustrated literature and orders to—THE ACORN MACHINE TOOL CO. (1936) LTD., 610-614, High Road, Chiswick, London, W.4. Telephone: CHIswick 3416-7-8-9.

Lathe Users must have our new MYFORD HANDBOOK, 2s. 6d. post free.—GARNERS, Redbrook Works, Gawber, Barnsley.

If it's Really Urgent, phone Barnsley 2908.—GARNERS, of course!

Split Chucks for Watchmakers' Lathes, 6 mm., $\frac{1}{2}$ mm., and 8 mm., at 7s. 9d. each, postage 6d.—JOHN MORRIS, 64, Clerkenwell Road, London, E.C.1.

Toolroom Paper Turning Attachments for "Atlas" Lathes now available ex-stock at £13 15s. each. A really first-class job. Satisfaction guaranteed or money refunded. Cheques and orders to—THE ACORN MACHINE TOOL CO. (1936) LTD., 610-614, High Road, Chiswick, London, W.4.

Air Compressors, ex-Government heavy duty, twin-cylinder. Output up to 11 c.f.m. according to speed. Pressures up to 100 lb. per sq. in. Built regardless of cost, £16 each. Also ex-Government Air Receivers suitable for the above, £3 10s. each.—JOHN STEEL, Bingley, Yorks. Phone: 1036 (4 lines).

Manor Tool Co. Small tool specialists in precision instruments, taps and dies, twist drills, reamers, electric tools, vices, and we are also Myford agents. S.A.E. enquiries. Mail order service only.—656, Romford Road, London, E.12.

Chucks from Stock.—CORBETT'S (LATHES), Stanton Hill, Mansfield, Tel. 583, Sutton-in-Ashfield. Offer 200 Crown 4" S.C. Chucks, price £4 7s. 0d. each; 75 5" S.C. Chucks, price £4 17s. 6d.; $\frac{1}{2}$ S.C. Chucks, price £5 11s. 6d.; Burnerd 5" self-centring, price £7 19s. 6d.; 100 6" Crown Independent Chucks, price £4 5s. 6d.; 100 C.V.A. 4" self-centring Precision Chucks, price £5 2s. 6d.; 50 6" Independent C.V.A. price £4 18s. 0d.; High-speed Lathe Tools, "Speedcut"; "Doubtlemasher"; "Ultra Capital"; etc., sets of 8, price 30s.; 250 0 $\frac{1}{2}$ capacity, Jacob Type Drill Chucks, complete with No. 1 or 2 Arbors, price 37s. 6d.; 0 $\frac{3}{4}$ ditto, 32s. 6d. Trade Supplied. Terms C.W.O. or C.O.D.

Power Jig Saws, 3 C.F. Compressors, 6 C.F. Compressors, Air Chambers with gauge, etc., $\frac{1}{2}$ pt. Spray Guns, 1-pt. Spray Guns. Air Hose, V Belts, Motor Pulleys, etc. Illustrated lists.—H. HALL, 2, Glamis Way, Greenford, Middx.

For Sale. Unused Runbaken High-Speed "Multi-Tool," complete with accessories, £25.—DOVE, 101, Dean Road, Scarborough.

Sale. Castings, Wheels, Boiler Shell, Tubes, unfinished Frames, Hornblocks, etc., 24" "Austere Ada." Exchange for Marine Engine or highest offer.—STREET, 26, Ware Road, Herford.

Selling Up. Useful Tool Kit 12 centring drills, 3 sizes, 10s.; 8 side and end mills, $\frac{1}{2}$ " and under, T.S., 25s. also 8 ditto, with parallel shanks, 30s.; cheap complete sets fractions, numbers, letter drills; bargains—various types milling tools; cheap complete sets counterbores and countersinks, precision gauges, lathe cutters, etc.; full details on application. All unused H.S.S. All subject approval. Send S.A.E. to—Box No. 4674, MODEL ENGINEER Offices.

"Auswal" Lubricator, as reviewed in THE MODEL ENGINEER, of April 17th, 1947. A precision oil pump made to extremely fine limits for the model engineer. The perfect pump for small quantities of lubricant at high pressure. Price £3 each.—AUSWAL SMALL Tools, 191-193, London Road, Kingston, Surrey.

Wanted. 8 mm. Precision Lathe and Accessories. Sale. 2" S.C. Wade, many major improvements, £11 10s. 0d., also unused, wood-turning Lathe, 33" x 20", £6.—10, Somerhill Road, Hove.

For Sale or Exchange. Small Motor, 50 v., a.c., 3-spindle, 30s.; Desoutter Air Drill, complete, £4 0s. 0d.; Verdict Test Clock, £2 0s. 0d.; Copper Tube Boiler, 4 $\frac{1}{2}$ " x 12", all fittings, tested 300 lb. sq. in.; $\frac{1}{2}$ " capacity Drill Chuck, 12s. 6d.; Silver Solder, 12s. 6d. lb.; 13 H.S.S. End Mills, 3/32"- $\frac{1}{4}$ ", £2; H.S.S. Drills, 1-80, £2, 1-60, 30s., or 10 5s. 6d., $\frac{1}{2}$ "- $\frac{3}{4}$ ", 29 on stand, 30s., 3/32- $\frac{1}{4}$ ", 10 for 5s. 6d., A-Z, 3 for 2s., 5 Centre Drills, 5s. 6d.; small Reamers, straight or taper, 3 for 2s.; 50 $\frac{1}{2}$ " and $\frac{1}{4}$ square shank assorted H.S.S. Lathe Tools, 1s. each; Copper Tube, 4 $\frac{1}{2}$ " x 4" x 12"; small Files, 6d. each; Pressure Gauge, 2" dial, 0-120 lb.; Grinding Wheels, Sticks Model Material, $\frac{1}{2}$ "- $\frac{3}{4}$ " drill steel. All the above items are new and unused. Also several models, Shaper Parts, Double-ended "Wolf" Grinder, 230/50 a.c., 8" wheels; Faber Slide Rule. All little used and in perfect condition.—Box No. 4665, MODEL ENGINEER Offices.

Pressure Gauges, 0-20 lb. sq. in., 2 $\frac{1}{2}$ " diameter bakelite case, 5s. each.—MITCHELL, Holmrook, Cumberland.

Wanted. Shaping Machine, hand type, about 7" stroke. Must be in good condition.—Hot Scot ENGINEERS LTD., 224, Cumbernauld Road, Stepps, by Glasgow.

Antique Curio. Early hand-made clock-makers' Lathe, in good condition. Photograph, etc., from—DRAPER, 61, Church Road, Soundwell, Bristol.

Workshop Clearance, three-drawer Bench, experimental Torch Battery Press and Filler, with materials, Valve Receiver, a.c. Charger, Loudspeakers, many Radio Components, £7 10s. 0d. Viewed by appointment.—W.S., 12, Cumberland Road, Kew.

Wanted. 3-4" B.G.S.C. Lathe. Must be in good order.—MONRO, 89, Woodland Road, Darlington.

New "Super Adept" Lathe, chuck, faceplate, countershaft, carriers, tools, angle-plate, electric motor, £11.—TAYLOR, 9, Bentinck Square, Lincoln.

For Sale, or exchange for 24" Lathe, "Super Adept." Self act, screw-cutting, chucks, faceplate, steady, turret, tools, etc. Offers to—T. E. CULPIN, 50, Reginald Road, Scunthorpe.

Sale. 4" Round-bed Drummond Lathe. All change wheels, wooden stand, Drummond treadle. Seen evenings and Saturdays.—"B," 58, Drakefield Road, London, S.E.14.

Drummond Lathe. 3 $\frac{1}{2}$ " screwcutting, in new condition, on stand with new 230 v. a.c. 1/6 h.p. motor, as transportable unit. Faceplate, Burnerd S.C. chuck, all gears, etc. Fixed or free drive by conveniently placed lever, six speeds.—FRANCIS, Horam E., Sussex. Tel.: 5.

Bench Miller for sale, £25. De-grinder wanted.—STARES, 3, Great Sutton Street, E.C.1. Clerkenwell 2303.

Wanted. Compound Rest for 3 $\frac{1}{2}$ " Lathe, less saddle, sale or exchange "Wee Megger," leather case, $\frac{1}{2}$ list price.—ASTRON, Elsden, Coffinswell, Newton Abbot, Devon.

Sale. 4" Drummond Screwcutting Lathe with countershaft, $\frac{1}{2}$ h.p. 230 a.c. motor, 3/4" jaw chucks, fitted hollow spindle, 4-way toolpost. Numerous tools, brazing tackle, etc., £40.—27, Leeds Road, Ilkley, Yorks.

4" Round-Bed Drummond S.C. Lathe (bench), two chucks, one drill chuck, calibrated feeds. Good condition, £22 10s. 0d.—"L," 19, Penbury Road, Tottenham, N.17.

Wade Lathe (B.G.S.C.) wanted, good condition, state price.—DAWSON, 30, Wildwood Road, N.W.11.

Hand Shaper Wanted. Details please to—Box No. 4672, MODEL ENGINEER Offices.

Wanted. Motorised "Atlas" 5" Lathe. About £50.—Box No. 4673, MODEL ENGINEER Offices.

10" Bench Type Disc Sanders and Linishers, vertical spindle, ball-bearing, var rope drive, £5 5s. 0d., six-weeks' delivery. Details on request.—F. SIMPSON, Engineer, Seacroft Green, Seacroft, Leeds.

Several Incomplete large and small Lathes. Lot of odd parts. Treadle Wheels, Gears, Pulleys. Callers preferred.—PIKE, 36, Brendhouse Road, Hackney.

Wanted. 4" Drummond Lathe. Reasonable price. Also Vice.—RHODES, 52, Chesham Street, Bradford.

MODELS

Three Westbury Winners. Apex 15-c.c., New Atom 6-c.c., and New Atom III 6-c.c., with rotary valve. Engine castings of DTD 424 alloy, 9 tons tensile, sp. gr. 2.56, lighter and stronger than diecast. Sets of castings, blueprints, gearing, ball-races, piston-rings, plugs, and all equipment. Send us your requirements for special castings. Trade enquiries invited.—THE HEADINGLEY MOTOR & ENGINEERING CO. LTD., 8, Otley Road, Leeds.

"Seal" 15 c.c. Four-Cylinder Engine Castings, £3, bearings, 4s. 6d. Camshafts and gears, 30-c.c., four-cylinders. S.V. and O.H.C., 10-c.c. twin two-stroke. S.A.E. for list. Trade.—Below.

Boiler Fittings, high quality, to "L.B.S.C." standards. Clacks, 3s. 9d., Safety valves, 5s., Wheel valves, right-angled, 7s. 6d., Unions, etc., for 3 $\frac{1}{2}$ " gauge. List. Trade invited.—CRAFTSMANSHIP MODELS LTD., Norfolk Road Works, Ipswich.

"Wildcat" 5-c.c. Diesel, complete kit, drawings and instructions, 25s. Kit of partly-machined parts from which engine can be built without lathe, 6s. 6d. Spare parts supplied. S.A.E. for list.—DAVIES CHARLTON & CO., Rainhill Road, Barnoldswick, Colne, Lancs.

3" Scale Chairs. For sale, 3,000 $\frac{2}{3}$ " Scale Chairs, supplied by Bassett-Lowke and little used.—TALBOT, Fifield Head Magdalen, Gillingham, Dorset.

Precision-Machined Cylinder Sets, guide-bars and crossheads fitted. Exacting standards ensure quality and accuracy. "Hielan' Lassie," £15 10s. 0d. per set; "Bantam Cock," "Princess Marina," "Royal Scot," at £11 10s. 0d. per set; $\frac{1}{2}$ " gauge, $\frac{3}{8}'' \times \frac{1}{8}''$ stroke, 7s. 0d.; Gauge "1" "Hielan' Lassie" and "Juliet," £5 0s. 0d. and £4 12s. 6d. per pair. Gauge "0" $\frac{3}{8}'' \times \frac{1}{8}''$ stroke, £2 18s. 6d. Castings or part-machined cylinders supplied Lists 6d. Enquiries S.A.E.—QUICKSET TOOLHOLDER CO. LTD., 10, Floriston Gardens, Stanmore, Middx.

Beam Engine wanted, about 4" or 5" bore, any condition.—SMITH, Langton, Pinxton, Nottingham.

Miniature Railway. Tenders are invited for the construction and operation of a miniature railway on land in the Boscombe Overcliff Gardens, Bournemouth. Further particulars may be obtained on application to the Parks Superintendent, Town Hall, Bournemouth. Tenders in plain sealed envelopes endorsed "Tender for Miniature Railway," should be forwarded so as to reach the undersigned not later than 9 a.m. on January 16th, 1948. The Council do not bind themselves to accept the lowest or any tender.—A. LINDSAY CLEGG, Town Clerk, Bournemouth.

Well Constructed Plain Mill Engine, 2" \times 4", lagged cylinder, disc crank, flywheel between bearings, large heavy moulded cast bed, f8. Unused re-bored Levis Motor, might suit lawn mower, no magneto, f4. Powerful "Polygon," Wall foot-power, wet or dry grinder, 8" \times 1 $\frac{1}{2}$ " Emery Wheel, as new, f4. All packing cases extra. Wanted Small Launch Engine.—L.I.F.U., Strickland or similar, reasonable condition.—DEWHURST, Riverside, Reedham, Norfolk.

1 $\frac{1}{2}$ " Scale Loco parts, all machined, £5. S.A.E. for full details.—Box No. 4657, MODEL ENGINEER Offices.

For Sale. 3 BTH Magnetics, unused, single spark, platform mounting, £2 each. "Amal" Carburetor, 500-c.c., 10s. New "Amal," 125-c.c., 20s. Villiers 125-c.c., single lever, 20s. Also two 1 gal. Petrol Tanks, Villiers Crank Case.—DUNHAM, Christchurch Road, New Milton.

"Sentinel" Boiler, welded steel, 9" \times 4 $\frac{1}{2}$ ", tested 120 lb., all fittings, top feed grate, super-heater, perfect, £6.—Below.

Wanted. 1/3 h.p. Repulsion or Capacitor, quiet, 240 volts, 50 cycles, single phase.—SNELLING, 306, Watford Road, Croxley Green, Herts.

For Sale. 36" Restricted Class Model Yacht. 3 suits of Sales, all in very good condition.—RIGBY, 6, Flora Grove, St. Albans.

2 $\frac{1}{2}$ " Gauge coal-fired Locomotive ("Flying Scotsman"), passenger hauler, as new, photograph. Value approx. £60. Exchange good Home Cinema.—ILEY, 61, Lawson Street, North Shields, Northumberland.

Blueprints from "L.B.S.C." Original Drawings. "Hielan' Lassie," 11 sheets, 39s. 0d. set; "Juliet," 6 sheets, 16s. 0d. set; "Iris," 4 sheets, 12s. 0d. set; "Jeanie Deans," outline, 2s. 0d., detail sheets, 2-3-4-5, 3s. 6d. each; "Juliet" gauge "1" 5s. 0d. set; "Chingsford Express," 5s. 0d. set; "Mollyette," 3s. 3d. set. Other locomotives being prepared, "Rainhill," "P. V. Baker," "Southern Maid," etc. 2 $\frac{1}{2}$ " or 3 $\frac{1}{2}$ " gauge injectors, 33s. 0d. Boiler fittings made to order. Overseas enquiries invited. Small stock 2 $\frac{1}{2}$ " gauge Driving Wheels. Postage extra.—PIPER, 12, Church Road, Willesborough, Ashford, Kent.

Gauge "1" Loco., Coaches, Wagons, Track, 6v. Battery, £17 10s. 0d.—DUNN, 41, Fortescue Road, Bourne-

Basset-Lowke Model Electric Rail-way, 1 $\frac{1}{2}$ " gauge, 2 locomotives, 15 goods, 9 passenger vehicles, about 90 ft. track, double cross-over, 10 points. Station, electric signals and cabin. Electric supply accessories. £70 or nearest offer.—Box No. 4661, MODEL ENGINEER Offices.

Locomotives (4), gauge "1," clock-work, L.M.S., etc., as new, offers over £40. (Would separate.) Others (steam and electric), some pre-grouping, list sent.—ROBINSON, Mill House, Marston Maena, Somerset.

Wanted. Boiler, vertical, multi-tubular. Complete with fittings, 30" \times 15", or near. Must be in good condition. Also Horizontal Steam Engine. Price and particulars to—PEARSON, Windyridge, Great Ayton, Middlesbrough.

Get Your Prestacon Outfit the easy way, from Scottish Modelcraft (Bellwood Bros.), Dumfries. Write details. Catalogue 4d.—SCOTTISH MODEL CRAFT (BELLWOOD BROS.), Dumfries.

Scale Model Railway Coaches in "1," "2 $\frac{1}{2}$ " and "3 $\frac{1}{2}$ " gauges. Hand-made with interior and exterior fittings. Painted and lined in main line companies' colours or to customers' requirements. Apply—MILLER, Oldleys, Liverton, Newton Abbot, Devon.

Steam Generating Set. Stuart Sirius Twin, direct connected to enclosed 6 volt 40 watt dynamo, with ammeter and fuses; unused Government surplus. Complete in steel case, £10.—Box No. 4670, MODEL ENGINEER Offices.

For Sale. 3 $\frac{1}{2}$ " gauge coal-fired 4-4-0 "Dunlastair" Locomotive and Tender, £50.—COLES, 3, Woodstock Close, Stanmore, Middx.

Very Powerful 3 $\frac{1}{2}$ " gauge, 2-8-0 "Austere Ada," in good condition. Will haul heavy passenger loads for hours. Engine fitted with usual pumps, injector, etc. Boiler recently tested to 200 lb. Also with above, two carrying cases, £120. Can be seen any time.—S. C. WADE, 158, West Wycombe Road, High Wycombe, Bucks.

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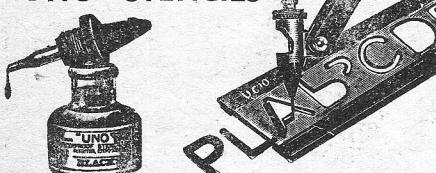


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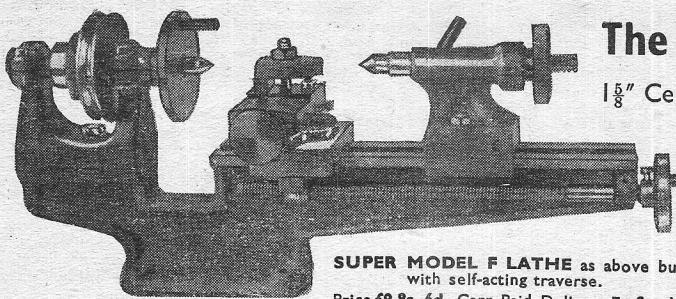
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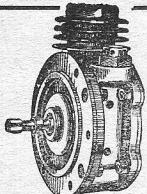
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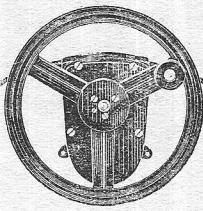
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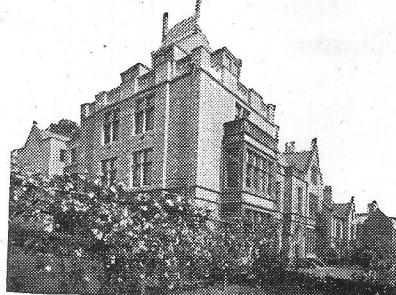
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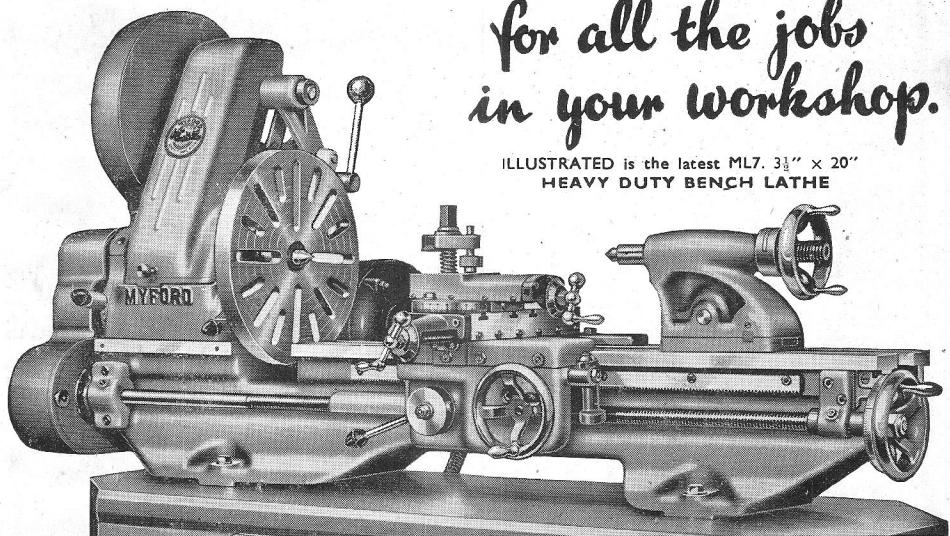
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